You can stop reading now.

Introducing NEC Direction™ PCs. The latest in cutting edge technology.

Of course, if you'd like substantiation for that claim, you'll have to read the rest of this ad. Then, we think you'll agree the NEC Direction PC is one of the most advanced PCs of its time. Not surprising when you consider NEC has always been at the forefront of technology with such innovations as the first color laptop and the first workgroup servers with redundant hot-swap power, disks and fans. But if you'd like to speak to someone about the Direction PC rather than just read about it, call NEC NOW.℠ You can speak to a knowledgeable System Consultant or, if you prefer, work with a highly qualified NEC reseller partner. Either of whom will help you customize and order one of the most advanced PCs in this or any magazine out there.

Why NEC NOW?

- The security of partnering with a company known for its technological innovations.
- The flexibility of ordering direct or through a reseller.
- The expertise of System Consultants.
- The immediate availability of competitively priced products.
- The resources of one of the world's largest computer companies.

NEC NOW.

MMX™ intel inside pentium® PROCESSOR

©1997 NEC Computer Systems Division, Packard Bell NEC, Inc. NEC, Versa, and MultiSync are registered trademarks; VersaBay, A700, C700, C500, ESM, PortBar, MiniDock and Express5800 are trademarks, and UltraCare is a service mark of NEC Corporation, all used under license by Packard Bell NEC, Inc. Direction, VersaNote, VersaExec, and MagicEye are trademarks and NEC NOW is a service mark of Packard Bell NEC, Inc. Leasing based on typical 36-month lease with purchase option. Other lease options may be available, leasing arranged by third party leasing company to qualified customers. Prices do not include shipping or applicable sales tax, are valid in the US only and are subject to change without notice. Products and specifications are subject to change without notice. *Product is 56Kbps capable. However, due to FCC rules which restrict power output of the service providers' modems, current download speeds are limited to approximately 53Kbps. Actual speed may vary depending on line conditions. MS, IntelliMouse, Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. NetWare and Novell are registered trademarks of Novell, Inc. The Intel Inside logo, LANDesk and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. All other trademarks and registered trademarks are property of their respective owners.

DELL DIMENSION DESKTOPS FOR BUSINESS

Common features: ◆ Mini Tower Model ◆ 512KB L2 Cache ◆ 24X Max[1] Variable CD-ROM Drive ◆ Microsoft® Office 97 Small Business Edition plus Bookshelf 96 ◆ Microsoft Windows 95 ◆ Microsoft Mouse (MS IntelliMouse on XPS Systems) ◆ 2 Universal Serial Bus (USB) Ports ◆ 3 Year Limited Warranty[1] with 1 Year On-si
Upgrades: ◆ 3Com® 3C905 Fast EtherLink® XL 10/100 PCI Card, add $99. ◆ 4/8GB EIDE TR4 TBU, add $199. ◆ APC Back-UPS Pro 650, add $299. ◆ 3 yrs. On-site Se

NEW DELL DIMENSION® XPS D300
300MHz PENTIUM® II PROCESSOR FEATURING MMX™ TECHNOLOGY

Common features listed above plus:
- 64MB SDRAM Memory
- *NEW* 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- 1200HS Monitor (17.9" v.i.s., .26dp)
- *NEW* Matrox Millennium II 8MB WRAM Video Card*
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers

★ *Upgrade to 128MB SDRAM, add $499.*

$3499

Business Lease[2]: $123/Mo.
Order Code #500909

NEW DELL DIMENSION XPS D266
266MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 32MB SDRAM Memory
- *NEW* 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- *NEW* 1000TX Trinitron® Monitor (15.9" v.i.s., .26dp)
- *NEW* Matrox Millennium II 8MB WRAM Video Card*
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers

★ *Upgrade to 64MB SDRAM, add $199.*

$2899

Business Lease: $105/Mo.
Order Code #500908

NEW DELL DIMENSION XPS D233
233MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 32MB SDRAM Memory
- *NEW* 6.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card*
- AWE64 Value Sound Card
- Altec Lansing ACS-90 Speakers

★ *Upgrade to an 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms), add $99.*

$2499

Business Lease: $90/Mo.
Order Code #500907

DELL DIMENSION XPS M233s
233MHz PENTIUM® PROCESSOR **WITH MMX TECHNOLOGY**

Common features listed above plus:
- 32MB SDRAM Memory
- 4.3GB Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* Matrox Millennium II 4MB WRAM Video Card
- Sound Blaster 16 WaveSynth Wavetable Sound
- Altec Lansing ACS-90 Speakers

★ *Upgrade to 64MB SDRAM, add $199.*
★ *Upgrade to a 1000TX Trinitron Monitor (15.9" v.i.s., .26dp), add $99.*

$2199

Business Lease: $79/Mo.
Order Code #500906

OUR NEW 300MHz SYSTE
AND PRIC

DELL DIMENSION DESKTOPS FOR HOME

Common features: ◆ Mini Tower Model ◆ 512KB L2 Cache ◆ 24X Max[1] Variable CD-ROM Drive ◆ *NEW* 56K Capable™* U.S. Robotics x2 WinModem ◆ MS Home Essentials plus Best of Entertainment Pack ◆ Microsoft Windows 95 ◆ MS IntelliMouse ◆ 3 Year Limited Warranty with 1 Year On-site Service
Upgrades: ◆ Iomega Zip 100MB IDE Internal Drive w/One Cartridge, add $99. ◆ 3-Pak of Zip 100MB Cartridges, add $39. ◆ HP DeskJet 820Cse Color Printer, add $299.

NEW DELL DIMENSION XPS D300
300MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 64MB SDRAM Memory
- *NEW* 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- 1200HS Monitor (17.9" v.i.s., .26dp)
- *NEW* Matrox Millennium II 8MB WRAM Video Card*
- AWE64 Value Sound Card
- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive with One Cartridge

$3799

***NEW* Personal Lease[2]: $169/Mo.**
Order Code #500904

NEW DELL DIMENSION XPS D266
266MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 32MB SDRAM Memory
- *NEW* 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- *NEW* 1000TX Trinitron Monitor (15.9" v.i.s., .26dp)
- *NEW* Matrox Millennium II 8MB WRAM Video Card*
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-290 Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive with One Cartridge

$2999

***NEW* Personal Lease: $134/Mo.**[2]
Order Code #500903

NEW DELL DIMENSION XPS D233
233MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 32MB SDRAM Memory
- 4.3GB Ultra ATA Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card*
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers

★ *Upgrade to 64MB SDRAM, add $199.*
★ *Upgrade to Altec Lansing ACS-290 Speakers with Subwoofer, add $75.*
★ *Upgrade to 1000TX Trinitron Monitor (15.9" v.i.s., .26dp), add $99.*

$2399

***NEW* Personal Lease: $107/Mo.**[2]
Order Code #500902

DELL DIMENSION XPS M200s
200MHz PENTIUM PROCESSOR **WITH MMX TECHNOLOGY**

Common features listed above plus:
- 32MB SDRAM Memory
- 4.3GB Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Nitro 4MB EDO PCI Video Card
- Sound Blaster 16 WaveSynth Wavetable Sound
- Altec Lansing ACS-90 Speakers

★ *Upgrade to a 64MB SDRAM, add $199.*
★ *Upgrade to 6.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms), add $79.*

$1999

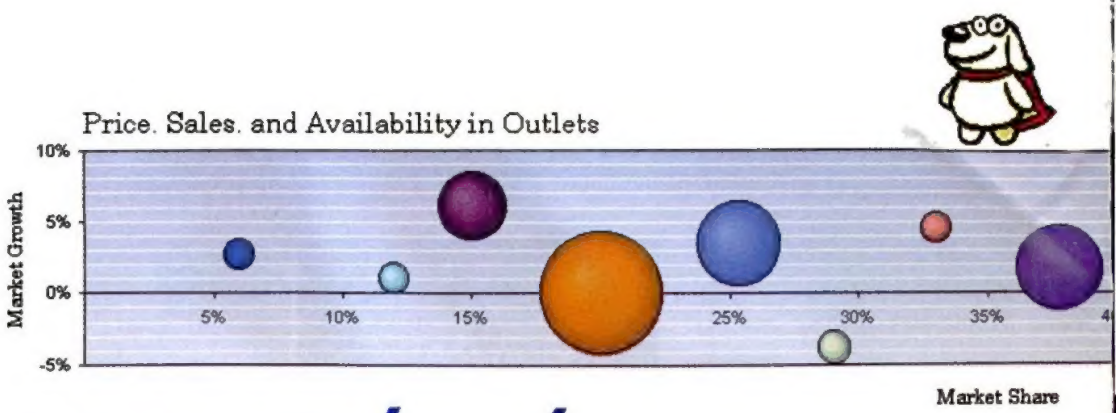
***NEW* Personal Lease: $89/Mo.**[2,*]
Order Code #500901

***Product, as configured, will ship by October 20. Please call for updated shipment information.**

MMX™
intel inside
pentium® II

Pricing is not discountable. †For a complete copy of our Guarantees or Limited Warranties, please write Dell USA LP Attn: Warranty, One Dell Way, Round Rock, TX 78682. [2]Leasing arranged by third-party leasing companies to qualified customers. [3]System weight with floppy drive or CD-ROM in options bay. ‡On-site service provided by an independent third-party provider. May not be available in certain remote areas. [1]* 20X Max/11X Min. 4X12X Max./6X Min. *24 Max./12X Min. **x2 products are capable of 56Kbps downloads. Due to FCC rules that restrict power output, however, current download speeds are limited to 53Kbps. Upload speeds are limited to 33.6 Kbps. Actual speeds may vary depending on line conditions. †Advertised configuration varies from tested configuration. *4MB Baseboard with a 4MB Upgrade Module. *Prices and specifications valid in the U.S. only and subject to change without notice. Intel, the Intel Inside logo, LANDesk and Pentium are registered trademarks and MMX and Pentium II are trademarks of Intel Corporation. MS, Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. 3Com and EtherLink are registered trademarks of 3Com Corporation. Trinitron is a registered trademark of Sony Corporation. DirectLine is a service mark of Dell Computer Corporation. ©1997 Dell Computer Corporation. All rights reserved.

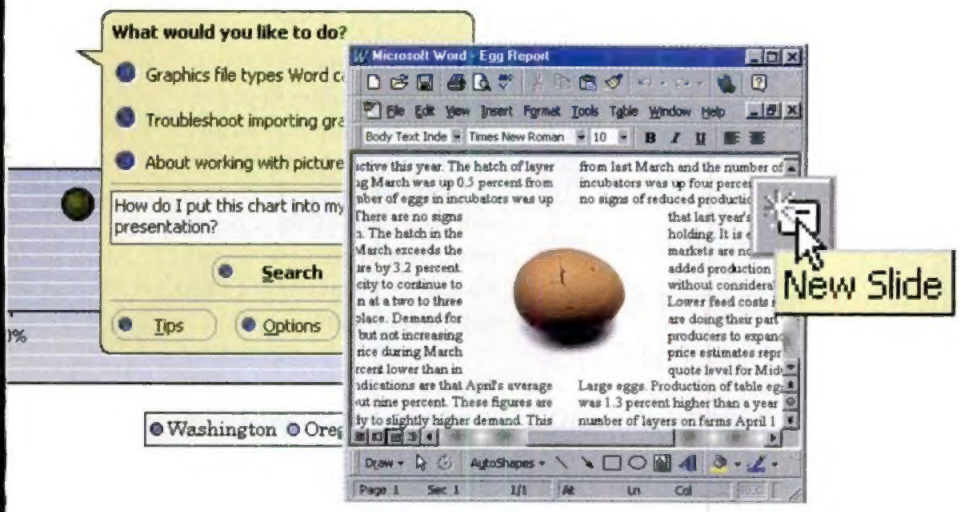
CIRCLE 107 ON READER SERVICE CARD



Microsoft Office 97/now/

be the of your work.

©1997 Microsoft Corporation. All rights reserved.
Microsoft, PowerPoint and Where do you want to go today? are registered trademarks of Microsoft Corporation.



proud parent

They go out into the world every day, your words and figures and e-mails. Introduce them to new Microsoft® Office 97, and you can send them out with just that much more confident panache. First of all, Office 97 makes it easier to control the way text, shapes and even formats look with Office Art. You can make your point clearly and persuasively with the three new kinds of charts in Microsoft Excel: the exquisite pie-within-a-pie chart, the poignant conical chart and the lyrical bubble chart. Or draw freestyle tables in Word, erasing lines and stretching boxes as you go. Or animate your PowerPoint® presentation, using new ways to manipulate type and graphics (throw in sound and video clips to really wow 'em). Trying to figure out whether a capability even exists? Just ask your Office Assistant. It all adds up to clean, smart-looking work. Send it out proudly, and try not to cry. For more information, visit us online.

Where do you want to go today?® www.microsoft.com/office/ **Microsoft®**

The PC's Changing Image

The personal computer revolution has changed more than just the way we compute. It has changed the way we figure budgets, the way we create and publish documents, and the way we manage our finances. With the advent of electronic mail and the Internet, PCs have changed the way we communicate and share information.

Personal photography may well be the next area ripe for major changes at the hand of the PC. Let's face it: Today's process already seems a bit awkward. You take pictures with a traditional camera and film, take the film to a store for processing, and see your pictures hours or days later (unless you use instant photography, which has other drawbacks). It doesn't take much imagination to see that these days are numbered.

At some point in the none-too-distant future, you'll take your photos using a digital camera with a built-in LCD to show you instantly how the photo looks. You'll then attach the camera to a printer, and out will come your photos at any size you like. Easy and fast.

Yes, the photos taken by today's personal digital cameras aren't as good as those taken with traditional cameras. But look at how good digital cameras already are and you can bet they'll get better. On the high end, they are already good enough for almost all the product photography you see in *PC Magazine*. And many Web pages contain decent digital photos.

On the output end, an ink jet printer that costs a few hundred dollars can't produce a photo print as good as you'll get from film processing. But the quality is close, and these printers have become remarkably better in a short time. Again, high-end printers used by graphics professionals are pretty much already there, and mainstream technology is catching up quickly.

You can already use a software program to enhance the images you capture. Programs like Adobe Photoshop and PhotoDeluxe, Microsoft Picture It!, and MetaCreations' Kai's Photo Soap let you alter a photo at will. You can fix simple things like red-eye, adjust the lighting or contrast in a picture, or even merge photos together. Software soon will be smart enough to enable you to make basic photo improvements with minimal effort.

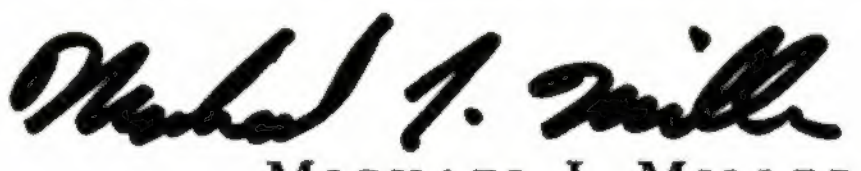
There's no question that the aforementioned changes will happen. This doesn't mean that all photo stores will disappear instantly, but they will have to adapt.

In a similar way, another transition is going on with greeting cards. Personal color printers are now ubiquitous, and programs for making greeting cards have suddenly become mainstream applications. In the past, software like Broderbund's The Print Shop let you create cards, but the process was difficult. Not anymore: The new version of Print Shop and programs from Microsoft (Microsoft Greetings Workshop) and Micrografx (American Greetings CreataCard Gold) are all designed to help you create your own cards easily.

Finally, a similar transition is going to happen with home video, though it seems a little further off. We have a few digital video cameras today, but they haven't yet become as mainstream as digital still cameras. Still, things like MPEG-2 capture are coming. In the meantime, we have boards that do a pretty fair job of capturing video streams from videotape or other input. And we have devices that do a good job of moving the video back out, either to a computer format or to videotape.

But the most advantageous change in this area is the software that lets almost anyone edit video. If you've ever sat through really long home videos—and who hasn't?—this is a real breakthrough. Not too long ago, only professionals could afford the equipment to edit video. Now, the basic equipment is within the reach of the typical PC user. It's a big change.

Photography, greeting cards, and home videos are three categories of consumer products that may seem at first blush to have little to do with the personal computer. Yet the PC is on the verge of changing all three drastically. I wonder which one will be next.



MICHAEL J. MILLER

PHOTOGRAPH BY SHONNA VALESKA

Copyrighted material

MICRON™ MILLENNIA® MME 200

intel 200MHz Pentium® processor with MMX™ technology
512KB pipeline burst cache, flash BIOS
48MB EDO RAM
4GB Ultra ATA hard drive
24X EIDE variable speed CD-ROM drive
3.5" floppy drive
100MB Iomega Zip drive
32 voice wavetable stereo sound with speakers
USR Sportster 56K x2 internal data/fax modem*
PCI 64-bit 3D video, MPEG, 4MB EDO RAM
17" Micron 17FGx, .26dp (16.0" display)
Tool-free minitower
Microsoft® Intellimouse™, 104-key keyboard
Microsoft Windows® 95 and MS® Plus!
Microsoft Office 97 Small Business Edition
Choice of Software Solutions Paks
5-year/3-year Micron Power™ limited warranty

$2,299

MICRON TRANSPORT™ VLX 133

133MHz Pentium processor
Intel 430MX chipset
256KB L2 pipeline burst cache
24MB EDO DRAM
2.1GB hard drive
11.3" DSTN SVGA 800x600
8X CD-ROM drive
16-bit stereo sound
Built-in stereo speakers and microphone
Motorola Montana 33.6 fax/modem with cellular connector
128-bit graphics accelerator
Zoomed video support
MPEG compatible
2 way infrared port
Touchpad pointing device
Modular floppy drive
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
Management Pak
Custom nylon carrying case
5-year/1-year Micron limited warranty

$2,399

MICRON MILLENNIA XRU

Intel 266MHz Pentium II processor (features MMX technology)
512KB internal L2 cache, 2MB BIOS
64MB EDO RAM
4GB EIDE hard drive
24X EIDE variable speed CD-ROM drive
3.5" floppy drive
100MB Iomega Zip drive
32 voice wavetable stereo sound with speakers
USR Sportster 56K x2 internal data/fax modem*
PCI 64-bit 3D video, MPEG, 4MB EDO RAM
17" Micron 700 FGx, .26dp (16.0" display)
USB Connection
Tool-free minitower
Microsoft Intellimouse,104-key keyboard
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
Choice of Software Solutions Paks
5-yr/3-yr Micron Power limited warranty

$2,909

HP PRINTER OPTIONS

HP DeskJet 692c printer - photo-quality color printing for the home, complete with cable . . .$319
HP LaserJet 6Lxi printer - affordable B&W printing, complete with cable $429

24-HOUR SHIPPING

*Same-day shipment is available for telephone or Internet credit card orders successfully booked by a Micron representative by 3:00pm MST, Monday through Friday. This service is available to customers who have received approved credit and have their Computers Now! systems shipped to the "bill to" address on their credit card.

Extra Hot.

Heat things up with Computers Now®!

Order a Micron computer through our Computers Now! program for same-day shipment.* Our pre-configured systems are packed with Intel Pentium and Pentium II processors, some featuring MMX technology. Our Millennia XKU and MME models fire off power and performance for the most demanding user. And, our TransPort VLX delivers a portable that's affordable.

No matter which Micron system you choose, you'll always get our award-winning, 24-hour customer support and a great limited warranty you won't find on a shelf anywhere.

Call Computers Now! for a computer that turns up the heat — and really burns the other guys up.

MICRON POWER™ WARRANTY

5-year limited warranty on microprocessor and main memory
3-year limited parts-only system warranty (1-year for TransPort VLX)
1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
30-day money back policy
24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.

Designed for Microsoft® Windows®95

Micron Sales Hrs: Mon-Fri 6am-10pm, Sat 7am-5pm (MT) Technical Support Available 24 Hours A Day, 7 Days A Week
Toll free from Mexico: 95-800-708-1755
Toll free from Canada: 800-708-1758 • Toll free from Puerto Rico: 800-708-1756 • International Sales: 208-893-8970 • International Fax: 208-893-7393

*Maximum transmission speed of up to 56Kbs when downloading data and 33.6Kbs when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

Call now to order.
800-776-4509
www.micronpc.com

MICRON ELECTRONICS™

©1997 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice; prices do not include shipping and handling and any applicable taxes. 30-day money-back policy does not include return freight and original shipping/handling charges, applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Lease prices based on 36-month lease. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

CONFIGURED FOR YOUR LIFE

CIRCLE 203 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

PC MAGAZINE
October 7, 1997
Volume 16
Number 17

COVER STORY

Big Screens, Low Prices

BY ALFRED POOR Bigger is better. Any questions? Now that vendors have slapped competitive prices on their newest 17- and 19-inch offerings, a good 17-inch display costs about $650, a 19-inch unit just a few hundred dollars more. Our tests on 50 17-inch and 7 of the newest 19-inch monitors have turned up some interesting results. It is time to do your eyes a favor? 106

17-inch monitors:

AcerView 76c.....110
ADI MicroScan 5G.....110
AOC Spectrum 7Glr.....110
ArtMedia TN1885T.....112
ATM Sylvania Precision S730A.....112
Compaq V70.....112
Continental DiGiview 1709D.....112
CTX EX700, VL710.....116
CyberVision ds86D.....129
Daytek DT-1731D.....129
Dell UltraScan 1000HS.....129
Delta DB-770KA.....129
EIZO Nanao FlexScan FX-C6, TX-C7.....129
Gateway EV700.....130
Hansol 700P.....130
Hewlett-Packard UltraVGA 1280.....131
Hyundai DeluxeScan 17B+.....131
IBM G72.....134
iiyama VisionMaster Pro 17.....135
KDS Visual Sensations VS-9.....136
LG GoldStar StudioWorks 78D.....137
MAG DJ707, DJ717.....137
Mitsubishi Diamond Pro 87TXM.....137
NEC MultiSync A700, E700.....140
Nokia Multigraph 447Za.....141
Optiquest V773.....141
Panasonic PanaFlat PF70, PanaSync S70.....141
Philips 107B.....142
PiXie PBC-7164.....142
Princeton EO72.....142
Sampo AlphaScan 750.....142
Samsung SyncMaster 700b, 700p.....144
Sceptre P75A.....144
Shamrock C705T.....144
Shinho AV2 765F.....144
Smile CB6736SL.....146
Sony Multiscan CPD-200SF, CPD-200SX, CPD-220VS.....145
TeleVideo SVP260 SuperView Pro.....146
Toshiba TekBright 700PM.....148
Utobia XP400.....148
ViewSonic G771, PT775.....148

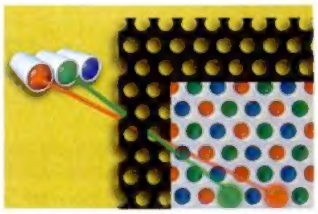
19-inch monitors:

Cornerstone Color 45/101sf.....148
Gateway EV900.....153
NSA/Hitachi SuperScan Elite 751.....153
Philips Brilliance 109.....153
PiXie 995.....156
Princeton EO90.....156
Sampo AlphaScan 810.....157

Editors' Choice.....109
Monitor Market: Growth of the Big Screens.....110
How to Contact the Vendors.....116
Performance Tests.....118
Summary of Features.....121
Choosing a Monitor.....130

SPECIAL PULLOUT SECTION

Choosing A Monitor



Which display technology to go with? Which bells and whistles to get? Here's everything you need to choose 121

Competing Display Technologies.....121
How Much Bigger Is Better?.....122
Is Higher Refresh Always Better?.....123

WWW.PCMAG.COM

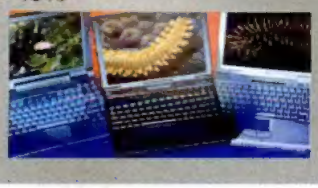
Test Your Own Monitor

How's your current monitor holding up? Join us online to test your own monitor and find out for yourself. Beginning September 17, we lead you through more than ten live interactive tests to help you decide whether this may be the right time to invest in one of the 17- or 19-inch dazzlers we just finished testing in PC Labs.

UP FRONT

From the Editor-in-Chief.....4
Pipeline.....9
Letters.....21
Trends.....28
- Electric companies move into telecom and Internet services
- A newer, bluer OS/2
- Inside PC Labs
- Information technology professionals earn top dollars

First Looks.....45
- Mobile powerhouses: Eight Pentium MMX/233 notebooks
- GPS: Retki MetroGuide and Door-to-Door CoPilot
- Kodak DVC 300
- YoYo



Second Looks.....81
- HP OfficeJet Pro 1150C: The machine that could
- Hotmail 5.1: The integration of WebCourier

COLUMNISTS

JAKE KIRCHNER.....30
BILL MACHRONE.....85
JOHN C. DVORAK.....87
INSIDE TRACK.....89
JIM SEYMOUR.....93
BILL HOWARD.....95

COVER: PHOTOGRAPHY BY MERT KERIM (VIDEO), SCOTT PETERSON (MONITORS)

FEATURES

VIDEO

The Complete Video Desktop

BY JAN OZER The PC's versatility is showcased yet again: Advances in hardware and software now make video a reality on the desktop. We review video-editing packages that any beginner might be comfortable with, as well as midrange packages for the professional. And we also report on several kinds of boards for capturing video 159

Video-Editing Software.....165
Entry-level:
Corel Lumiere Suite 1.0.....166
MGI VideoWave.....168
Presto! VideoWorks.....172
Midrange:
Adobe Premiere 4.2.....180
Kohesion 1.0.....182
MediaStudio Pro 5.0.....185

Editors' Choice.....166
Interface Face-Off.....167
Suitability to Task.....168
Still Analog After All These Years.....172
Summary of Features.....177
Cut-and-Paste Editing.....180

Video Capture.....187
ATI Technologies All-in-Wonder, PC2TV.....187
AzeenaVision 500.....190
Digital Video Arts WakeBoard.....190
FAST Electronics AV Master.....192
Intel Smart Video Recorder III.....196
Matrox Rainbow Runner Studio.....196
miroVideo DC20 plus and miroVideo DC30 plus.....198
Judging Video Quality.....188
Editors' Choice.....189
Performance Tests.....194
Seeing Digital.....200
MPEG Encoders.....204
Editors' Choice.....205
How We Tested.....208
FireWire Boards.....212
How We Tested.....212

CONNECTIVITY

Desktop Videoconferencing

BY DON LABRIOLA We rounded up the first generation of consumer-oriented videoconferencing upgrade kits designed to work over regular phone lines. There's still a ways to go in this market, but at least these companies are getting the price right 219

Boca Video Phone Kit.....222
Diamond Supra Video Phone Kit 3000.....226
Gallant InterVision Pro.....227
Panasonic EggCam GP-KR0011.....229
Tekram How-R-U Video Conferencing Kit.....231
3Com Bigpicture Video Kit 1622.....231

Glossary.....220
Editors' Choice.....221
The Intel Video Phone: Does It Steal the Show?.....222
H.323: Videophones on the Net.....226
Even Grandma Can Do It.....227
Summary of Features.....229

STREAMING VIDEO

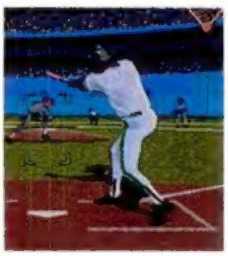
A Welcome Reception

BY JAN OZER The technology for sending video over communications lines is finally catching up with the desire—at least for intranets. We're still a ways from successful products for the Internet 233

CVideoNow 1.2 beta 1.....234
Microsoft NetShow 2.0 beta.....237
RealVideo Server 4.0.....238
StreamWorks 3.0.252 beta.....238
TrueStream 1.1 beta 19.....242
VDOLive 2.1.....244
VivoActive 2.0.....248
Vosaic MediaSuite 1.04.....251

How It Works.....234
Suitability to Task.....235
Editors' Choice.....237
Performance Tests.....240
Summary of Features.....244

AFTER HOURS



Fall Classics

Keep the sports season alive over this fall and winter with one of these exciting new baseball games.....283

Fall Classics.....383
Heroic Fun with Hercules.....388
More Fun on Twinsun, Hard-Core Hardware.....391

PC TECH

Who Goes There?.....253
Web analysis tools help you find out who's visiting your site.

Operating Systems.....265
Installing OS/2 remotely over a network.

Power Programming.....271
Building automation hierarchies with MFC, Part 1.

Utilities.....281
ZoomIn for quick bitmap enlargements.

PC SOLUTIONS

User-to-User.....307
Floppy disk drive demons; create a secret directory

Ask Our Advisors.....326
- Hardware
- Operating Environments
- Word Processing
- Spreadsheets
- Databases

AFTER WORDS

Abort, Retry, Fail?.....408

NETWORK EDITION

Follows page 96

Internet Security Solutions.....NE1
- Secure Access Firewall
- Cisco PIX
- Livingston FireWall IRX

First Looks.....NE13
- Meta IP 3.0
- Computer Peripheral Systems' Basic Mini Firewall and Enforcer

Multiple Access.....NE14
Cheap Disk Tricks

ALSO IN THIS ISSUE

PC Magazine Marketplace.....350
Premier.....350
Classified.....368
BusinessCard.....380
Reader Service Card.....395

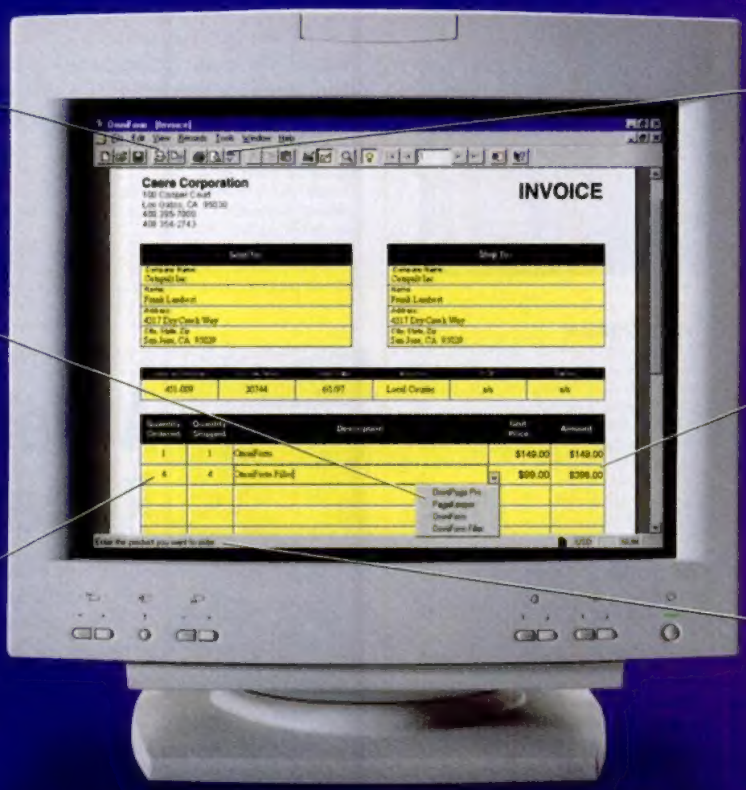
Advertisers' Index: Companies.....403
Advertisers' Index: Products.....404
Editorial Product Index.....402
Coming Up.....406

SIX KEY REASONS TO MAKE YOUR PAPER FORMS ELECTRONIC.

1 INSTANT FORMS: *Scan in existing forms for easy conversion, pick pre-built form components from a scrapbook or create custom forms using powerful design tools.*

2 EASY TO FILL OUT: *Filling out electronic forms is easy. Just tab and type. Enter data quickly from a list of drop down choices.*

3 DATABASE INTEGRATION: *Automatically builds a database for each form. Search and sort records. Supports popular database formats like Access, dBASE, Paradox and others. Supports OLE 2.0.*



4 SPELL CHECKING: *Electronic forms give you perfect results by spell checking your forms automatically. Plus you can print, fax or e-mail your forms to others.*

5 BUILT-IN CALCULATIONS: *Electronic forms can create calculations automatically or just drag and drop using over 35 Excel-like calculations.*

6 HELP: *If you're not sure what to put in a particular field, don't worry. Each field can have a help message that will assist you in filling out the form.*

OmniForm® GIVES YOU EXACT ELECTRONIC DUPLICATES OF YOUR PAPER FORMS IN SECONDS.

Don't put up with paper forms any longer. Using Caere's proven, award-winning OmniPage® OCR technology, OmniForm® lets you scan and convert existing paper forms into electronic forms in seconds. The result? Total electronic duplicates you can see on your computer screen, edit, fill out and even spell check. To enter or change data, you just tab and type. It's that easy!

With OmniForm, you can print and fax your forms, or e-mail them throughout your company. And it gives you a simple, but powerful tool set to edit your forms, change fonts, add graphics or design completely new forms from scratch.

OmniForm also performs automatic calculations, validates entries and creates databases. So the information you get from your forms works a lot harder for you, not the other way around.

Want to add users? OmniForm Filler lets even more people use your electronic forms for a small additional cost.

Why deal with paper when you can save so much time and hassle using OmniForm? Call or visit a reseller for your copy today.

caere

www.caere.com

Now only $149*

800-654-1187
extension 200

Available for Windows 95, Windows 3.1, Windows NT and Macintosh

*Suggested price US dollars—subject to change without notice. Offer valid in US and Canada only. Caere, the Caere logo, OmniPage and OmniForm are registered trademarks of Caere Corporation. All other names are the property of their respective holders. © 1997.

CIRCLE 292 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Pipeline

Collegiate Smart Cards

To most people, the notion of a cashless society is just hype. But across a handful of college campuses, students are using microchip-based smart cards for everything from making phone calls to doing laundry.

Smart cards are nothing new. First introduced over a decade ago in France, the cards have embedded microchips that store value and are accepted by any business that has a smart-card reader—a small, inexpensive, self-contained device.

The cards are likely to catch on first around corporations and other "closed" systems such as college campuses, says Dan Amdur of the market research firm Yankee Group. Students at the University of Pennsylvania, the University of Michigan, and the University of Florida are getting an early glimpse of cashless living.

On arrival this fall, each Penn student received a "smart" ID card with a digital photo, a magstripe that enables the card to function as an ATM card, and an embedded microchip that stores up to $50 in a PennCash account.

On a typical day, a Penn student on his way to class uses his PennCash account to pick up coffee at a local stand. After the class, he uses the PennCard as a photocopy card. Next he swings by the ATM and transfers money from his checking account to his PennCard. When he swipes his PennCard for lunch, the meal is automatically charged to his dining bill. And after catching another class, he uses the PennCard to call Mom and Dad from a corner pay phone. Returning to his dorm room, he swipes the card to enter the building.

Later this year Citibank—in conjunction with Chase Manhattan Bank, MasterCard, and Visa—will bring smart cards to Manhattan's Upper West Side to try them out in the unforgiving New York City market.

The 1.4-Oz. REX

Are you still searching for a pocket companion to store your contact information? Franklin Electronic Publishers' REX ($129) is about as portable as it gets.

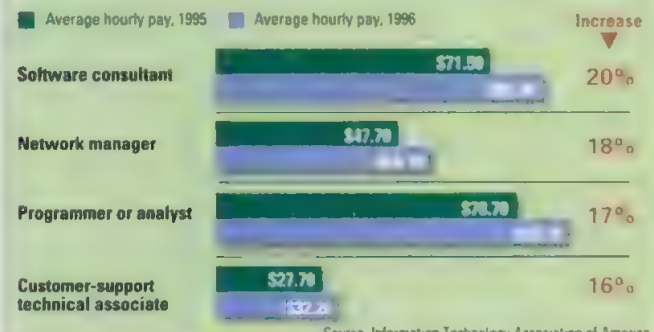
Actually a 1.4-ounce PC Card with a 9-line, 30-character LCD screen, the REX stores contacts, appointments, and memos. Input abilities are limited to setting the clock and alarms and checking off completed to-do list items.

To add contacts and meetings, you slip the REX right into your notebook's PC Card slot and follow the prompts of TrueSync Information Manager's Sync Wizard, which is essentially a customized version of Starfish Software's Sidekick. Using an optional serial-port cradle, you can transfer updated information directly from your desktop PC onto the REX.

ILLUSTRATION BY DOMINIQUE VITALE

Career Advice

Information technology employees are among the best-paid workers in the U.S., earning from about $27 to nearly $100 an hour. Salaries in this field increased dramatically from 1995 to 1996.



Source: Information Technology Association of America

Deep Blue Gets a Job

Only months after IBM's Deep Blue supercomputer dealt world chess champion Gary Kasparov a stunning defeat, companies are using the technology to solve some complex challenges, from molecule matching to money management.

Financial investment modeling is one of the top opportunities for Deep Blue technology. Several financial firms are now evaluating a smaller version of Deep Blue called the mini-SP2, which sifts through reams of historical and current stock and bond market data, comparing probable outcomes of investments much the same way that Deep Blue sifted through a huge database of historical chess games while "thinking" four chess moves ahead.

Pharmaceutical companies are evaluating a version of Deep Blue that sifts through huge databases of information on molecular structure and evaluates different combinations of molecules in an attempt to arrive at ideal molecular structures.

Test Your Own Monitor — Visit us online to test your monitor. Our live, interactive tests will diagnose any display glitches.

Videoconferencing That Really Works — Find out whether videoconferencing is ready to take the place of exhausting business trips.

Streaming Audio and Video — It's the next big thing on the Web: Download the latest streaming audio and video players.

Talk About Small Networks — Beginning September 15, join our experts for a discussion on how to set up a small-office network.

And Don't Miss These Web Extras — Daily industry trends analysis, up-to-the-minute reviews of new Internet products, and weekly commentary from John C. Dvorak, Michael J. Miller, and Don Willmott.

Pipeline

Joy Ride!

Force-feedback joysticks are about to add a new dimension to PC games. In September, a year and a half after Microsoft's acquisition of EXOS, a Woburn, Massachusetts–based maker of force-feedback technology for military and medical applications, Microsoft plans to introduce its SideWinder Force Feedback Pro joystick. In the meantime, game developers are busily adding all sorts of vibrations, bumps, jerks, and bounces to PC games.

The $150 unit adds tactile sensations to games with the help of several instruments in the base of the joystick: a digital camera that detects your grip and position, two motors—one for left/right motion and one for up/down motion, a gear train, and a 25-MHz "force coprocessor" that zips through force calculations. The result: You can feel the tap of a putter hitting a golf ball, the g forces of a race car's tight turn, the sensation of landing a jet fighter in strong winds, the vibration of whirling helicopter blades, and the pull of a magnet.

Microsoft is bundling three games with the joystick: Activision's Interstate '76, Playmates Interactive Entertainment's MDK: Mission Laguna Beach, and LucasArts' Star Wars: Shadows of the Empire: Battle for Hoth. According to Microsoft, about 40 developers are now working on games that use these effects.

High-Speed Cryo-chips

Talk about chilling out. Scientists at Rensselaer Polytechnic Institute are experimenting with cryo-electronics—electronic devices that operate at extremely low temperatures—and they've come up with some pretty cool ideas.

Kenneth Rose, professor of electrical, computer, and systems engineering, has concluded that delays on the metal wire interconnects—the paths that carry messages on chips—are steering the prospect of ever-faster computers into a brick wall. To achieve the computer industry's goal for 2007—that is, to squeeze 1 billion transistors onto a chip that runs at 1 gigahertz—Rose contends that the chips will need to be cooled down to a chilly -196° C (77° K).

Cooling those sluggish interconnects can reduce resistance by eliminating vibrations at the atomic level, he explains. Problem is, as any notebook owner knows, computers generate heat. So Rose has designed a chip package that, when submerged in -196° K liquid nitrogen, dissipates enough heat to keep the interconnects in a deep freeze.

THIS ISSUE'S CONTRIBUTORS: *Angela Hickman, Jon Kaufthal, Carol Levin, Melissa J. Perenson, Sebastian Rupley, and Don Willmott.*

ILLUSTRATIONS BY HARRY CAMPBELL (BOTTOM LEFT), ZOHAR LAZAR (TOP RIGHT)

What's in a Name?

Would you trust the Three Stooges with your corporate e-mail and network security? As it turns out, Larry, Moe, and Curly are among the names that high-profile network managers give their corporate servers.

Concord Communications recently surveyed corporate network managers to find the reasons behind server names. According to the results, most respondents choose to live out their fantasies when naming servers. Names drawn from science fiction were the most popular, especially "Star Trek" and *Star Wars* names. Celestial objects and space stations were the second-most-common names. Mythical heroes and scientists were also popular.

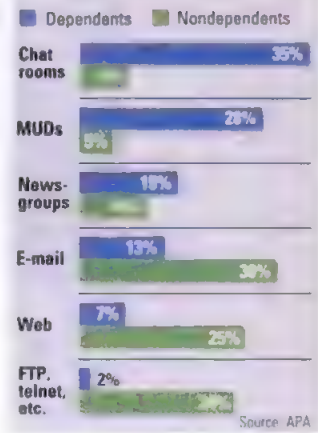
Cartoon character names were the third most popular. Chief executives can breathe a sigh of relief because Underdog, Bullwinkle, and Rocky are trafficking their e-mail and annual reports.

Too Much of a Good Thing

Are you addicted to the Internet? According to the American Psychological Association, which recently classified excessive Internet use as a legitimate disorder, you may be if cyberspace interferes with your life.

In a report released at the APA's annual meeting in August, Professor Kimberly Young of the University of Pittsburgh revealed that people who spend more than 38 hours a week participating in newsgroups, chatting, or sending e-mail may be at risk of developing an addiction—dubbed Pathological Internet Use.

Net Addictions



Young's report, based on a survey of 400 Internet users, revealed that for some dependents, the craving to go online is similar to the craving that smokers have for cigarettes.

Top-Selling Business Software

1. **Microsoft Windows 95 Upgrade** Microsoft
2. **Viruscan** McAfee
3. **Norton Antivirus** Symantec
4. **Corel WordPerfect Suite Upgrade** Corel
5. **Uninstaller** Cybermedia
6. **First Aid Deluxe** Cybermedia
7. **Norton Utilities** Symanetec
8. **Microsoft Office Professional '97 Upgrade** Microsoft
9. **First Aid** Cybermedia
10. **Netscape Navigator Personal Edition** Netscape

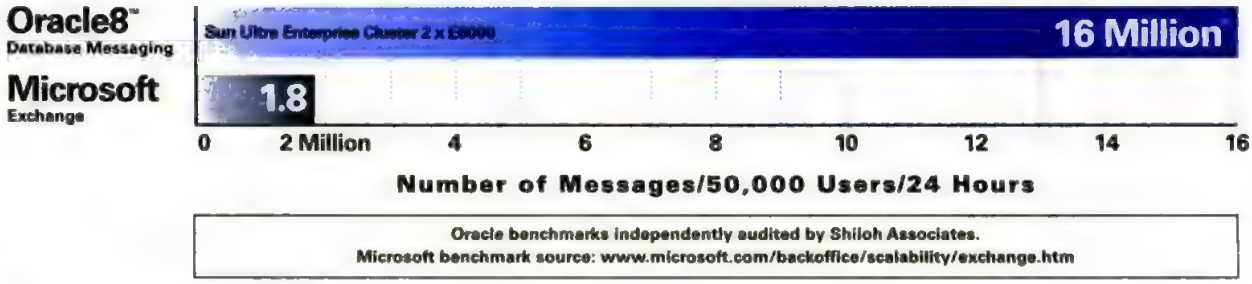
Source: PC Data, data for July 1997

Oracle8 Database Messaging Massacres Microsoft Exchange

50,000 Concurrent Users. 16 Million Messages per Day.

Scalability

The scalability benchmark measures the electronic mail messages per day for 50,000 users.



Oracle benchmarks independently audited by Shiloh Associates.
Microsoft benchmark source: www.microsoft.com/backoffice/scalability/exchange.htm

Oracle Database Messaging

- **50,276 concurrent active users**
- **16,031,520 messages in 24 hours on 1 Sun Ultra Enterprise Cluster Server**
- **40 gigabyte message store**
- **Fully mirrored for fail-safe instant recovery from catastrophic failure**
- **186 messages per second, 24 hours a day, 7 days a week, non-stop email**
- **Mission-critical performance and reliability for mission-critical messaging applications**

Oracle InterOffice™ — the industry's first database messaging software, unifying application data, messaging and business processes in a single server.

To learn more about the benefits of integrated database messaging vs. stand-alone, file-based email, call Oracle at 1-800-633-0518, ext. 11827 to receive your free White Paper, or sign up for a free-trial InterOffice account at http://www.interoffice.net

ORACLE®
Enabling the Information Age™

©1997 Oracle Corporation. All rights reserved. Oracle is a registered trademark and Oracle8, Oracle InterOffice and Enabling the Information Age are trademarks of Oracle Corporation.
Oracle benchmarks independently audited by Shiloh Associates. Oracle on Sun Ultra Enterprise Cluster 2 x E6000. *Number derived from 11,143 messages per minute, sustained throughput.
All other company and product names are the trademarks of their respective owners.

Maximum engine rated speed is 6 PPM in economy mode. Actual print speeds vary depending on system configuration, software application, page complexity, amount of page covered and print settings. Prices may vary. EPSON and EPSON Stylus are registered trademarks of Seiko Epson Corp. Micro Piezo is a trademark of Epson America, Inc. © 1997 Epson America, Inc.

YOU'VE GOT TO SEE IT IN EPSON COLOR.

An amazing paint job makes you think it's a bathing suit. These astonishing new printers let you know it's not. 1440 x 720 dpi. Photo Quality color. Laser-sharp black text. All from our exclusive Micro Piezo™ Technology—for a smaller, more consistent dot. You'll get print quality that's already won 33 major awards, including PC Computing's 5 Star Rating. In standard format or wide format. PC/Mac compatibility. Optional internal Ethernet. Up to 8 ppm black/7 ppm color on the Epson Stylus® Color 800. Plus a 2-year warranty. Call 1-800-GO-EPSON (ask for operator 3064) or visit us at www.epson.com for more details. For every detail, look at the output.

INTRODUCING THE WORLD'S FIRST 1440 DPI COLOR INK JET PRINTERS.

EPSON Stylus Color 800 about $449. High-performance business printer.

EPSON Stylus Color 1520 about $799. The versatile wide format printer.

CIRCLE 004 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

VIDEO FOR POWERPOINT.

WHY?

With Broadway,™ it's easy to add exciting, attention-grabbing video clips to your presentations. Just capture video from any source. Edit in a snap. Compress your edited clips into MPEG, the

IMPACT!

international standard. Then click ... and you have video in your presentation! Sound easy? It is. Broadway is geared to any level PC user. It costs less than $1000, and it's winning rave reviews from critics. Please visit our Web site or call to find out more.

www.b-way.com/ppt

800-249-1969 ext.35

Video Made Easy.

CIRCLE 248 ON READER SERVICE CARD
OR GO TO WWW.PCMAG.COM/ProductLink

PC MAGAZINE

EDITOR-IN-CHIEF Michael J. Miller
EDITOR Jake Kirchner
EXECUTIVE EDITORS Bill Howard, Peter McKie, Gail Shaffer, Don Willmott
EXECUTIVE DIRECTOR, PC LABS C. James Galley III
ART DIRECTOR Laura Baer
SENIOR NETWORKING EDITOR Frank J. Derfler, Jr.
SENIOR ONLINE EDITOR John Clyman **SENIOR EDITORS** Leon Erlanger (Networking and Communications), Carol Venezia (First Looks), Sebastian Rupley (West Coast)
MANAGING EDITOR Paul B. Ross
RESEARCH EDITOR Jim Bartimo

SENIOR ASSOCIATE EDITORS Carol Levin (Trends), Sharon Terdeman (Technical Columns) **ASSOCIATE EDITORS** Jamie M. Beales (Hardware), Toni F. Kistner and Sarah L. Roberts (Networking and Communications), David Lidsky (Internet), John Morris (Software), Tom Ponzo (First Looks Online), Michael E. Ryan (After Hours), Anush Yegyazarian (PCs) **ASSISTANT MANAGING EDITOR** Kim Schueler **PRODUCTION EDITOR** Monica Singnano **COPY CHIEF** Glen Boisseau Becker **STAFF EDITORS** Mary E. Behr, Robert Daly, Nancy E. Hirsch, Yvonne Kouloufhros, Regina Kwon, Josh Levy, Ellyn J. McCasland, Michael W. Muchmore, Melissa J. Perenson, Michael N. Rusignuolo **SENIOR WRITER** Robert S. Anthony **STAFF WRITERS** Karen J. Bannan, Angela Hickman, Cade Metz **SENIOR COPY EDITORS** Jennifer Golub, Joseph N. Levine **COPY EDITORS** Paul Dwyer, Michael Feist, Bill Kravitz, Barbara McGeoch, Josh Miller, Ann Ovodow **ASSISTANT COPY EDITOR** Carol Mangis **PRODUCTION MANAGER** Patricia Perkowski **SENIOR LAYOUT EDITOR** Lillian Gaffney **LAYOUT EDITOR** Michal Dlugmski **PRODUCTION SYSTEM SUPPORT ANALYST** Nancy Goodman-Slayback **LIBRARIAN** Nancy Sirapyan **LIBRARY ASSISTANT** Dolores Williams **EDITORIAL RESEARCHERS** Jennifer L. Anderson, Gary Berline, Stephanie Lindenbaum, Amy Portnoy **EDITORIAL ASSISTANTS** Brett Krasnove, Leslie Sorich **SYSTEM SUPPORT MANAGER** Craig Ellison **NETWORK SUPPORT ANALYST** Melvin Acevedo **COMMUNICATIONS MANAGER** Patricia Reger **ASSISTANT TO THE EDITOR-IN-CHIEF** Christine Curti **ASSISTANT TO THE EDITOR** Rita Aprahamian **ASSISTANT TO THE EXECUTIVE EDITORS** Christine M. Evelyn **ADMINISTRATIVE ASSISTANT** Christina Okang **SYSOP, PC MAGNET** Ken Hipple **EDITORIAL INTERN** LaToya Souvenir

CONTRIBUTING TECHNICAL EDITOR Neil J. Rubenking **CONTRIBUTING EDITORS** Bill Machrone (Editorial Director, New Products), Douglas Boling, Padraic Boyle, Bruce Brown, Brian Butler, Sheryl Canter, John C. Dvorak, Les Freed, Daniel Grotta, Sally Wiener Grotta, Michael J. Mefford, Edward Mendelson, Jan Ozer, Charles Petzold, Stephen W. Plain, Tony Pompili, Alfred Poor, Jeff Prosise, John R. Quain, Sal Ricciardi, Steve Rigney, Winn L. Rosch, Joe Salemi, Jim Seymour, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone

SENIOR ASSOCIATE ART DIRECTOR Richard Demler **ASSOCIATE ART DIRECTORS** Dean Markadakis, Michael Scowden **ASSISTANT ART DIRECTOR** Lora Morgenstern **GRAPHICS DIRECTOR** David Foster **GRAPHIC ARTIST** Mark Tyner **ART PRODUCTION MANAGER** Talor Min **CONTRIBUTING PHOTOGRAPHER** Thom O'Connor **ASSISTANT TO THE ART DIRECTOR** Frieda T. Smallwood

DIRECTOR, PC LABS, WEST COAST Steve Buehler **TECHNICAL DIRECTORS** Ben Z. Gottesman (Software), Nick Stam (Hardware) **DIRECTOR, OPERATIONS** John R. Delaney **SENIOR PROJECT LEADER** Jay Munro (Internet, PC Tech) **PROJECT LEADERS** Laura Cox (First Looks), Diane Jecker (Software), Jeff Mace (Graphics/Hardware), Robert Norton (Network Edition), S. Jae Yang (PCs) **PROGRAMMERS** Richard V. Dragan, Win Swarr **PRODUCT TESTING MANAGER** Charles Rodriguez **TECHNICAL ANALYSTS** Andrew Go, Amy Leung, Melanio Lopez, Margaret A. Piemonte, Mark Valentine **SUPPORT TECHNICIANS** Oliver Kaven, Jacqueline Paredes, Kevin Young **INVENTORY CONTROL MANAGER** Tom Kennedy **INVENTORY CONTROL COORDINATORS** Rob Graydon, Bryan Hughes, William Pagan **ADMINISTRATIVE ASSISTANT** Courtney L. Trabon

PC MAGAZINE CD
MULTIMEDIA PRODUCER Stephen Baldwin

PC MAGAZINE ONLINE
TECHNICAL DIRECTOR Larry Seltzer (Virtual Labs) **MANAGING EDITOR** Tin Albano **WEB DESIGNER** Albert Larew **SENIOR EDITOR** Heather Crombie **SENIOR PROGRAMMER** William Ulrich **SENIOR TECHNICAL EDITOR** Thomas W. Giebel **TECHNICAL EDITOR** Webster T. Mudge **DESIGNER** Marcie Gandell **STAFF EDITORS** Troy Dreier, Richard Egan, Tracy Kenevsky

VICE PRESIDENT, PUBLISHER Nancy Newman

NATIONAL ASSOCIATE PUBLISHER Peter Longo **NATIONAL SALES DIRECTOR** Vickie Pinsky **BUSINESS DIRECTOR** Andrew J. Cole **ASSOCIATE BUSINESS MANAGER** Christine Holsten **GROUP MARKETING DIRECTOR** Kathleen Goodwin **ASSOCIATE MARKETING DIRECTOR** John Wisdom **ASSOCIATE RESEARCH DIRECTOR** Gordon Plutsky **EVENTS MANAGER** Dawn Gudelis **MANAGER, PROMOTION AND PUBLIC RELATIONS** Lynne Hasluck

SENIOR ADVERTISING PRODUCTION MANAGER Susan Conrad **ADVERTISING PRODUCTION MANAGER** Robert Joy **ASSISTANT ADVERTISING PRODUCTION MANAGERS** Mark Connady, Ivis Fundichely **EDITORIAL PRODUCTION MANAGER** Pamela J. Berkowitz **COORDINATOR, EDITORIAL PRODUCTION** Louise Laberge

ADVERTISING OFFICE: One Park Ave., New York, NY 10016-5802; 800 33 MAG AD, 212-503-5100

THE INDEPENDENT GUIDE

PC Magazine is the Independent Guide to Personal Computing. Our mission is to test and review products and report fairly and objectively on the results. Our editors do not invest in firms whose products we review, nor do we accept travel tickets or other gifts of value from such firms. Except where noted, *PC Magazine* reviews are of currently available products. We review products without regard to advertising or business relationships with any vendor. Softbank, the corporate parent of Ziff-Davis Inc., has made a number of strategic investments in high-technology companies. A list of those companies is available online at *www.pcmag.com/faq*, and we will alert our readers to such investments whenever pertinent.

HOW TO CONTACT THE EDITORS

We welcome comments from readers. Send them to Internet address *pcmag@zd.com* or to *PC Magazine*, One Park Ave., New York, NY 10016-5802. Please include a daytime telephone number. *PC Magazine*'s general number is 212-503-5255. The West Coast Operations number is 415-513-8000. We cannot look up stories from past issues, recommend products, or diagnose problems with your PC by phone. For an index of past issues and a list of upcoming stories, browse *www.pcmag.com*.

If you are dissatisfied with a product advertised in *PC Magazine* and cannot resolve the problem with the vendor, write (do not call) Angela Tuka, Advertising Department, at the above address. Please include copies of your correspondence with the vendor.

SUBSCRIPTION SERVICES

The subscription rate is $49.97 for a one-year subscription (22 issues). Additional postage for orders outside the U.S. Please add $36 per year (American currency) for surface mail. For subscription service questions and address changes, call 303-665-8930 in the U.S. or 303-604-7445 elsewhere. You can send faxes to 303-604-7455, or 303-604-0540 outside the U.S. Or write to *PC Magazine*, P.O. Box 54093, Boulder, CO 80322-4093. We periodically make lists of our customers available to mailers of goods and services. If you do not wish to receive such mailings, please write to us and include a copy of your mailing label. For back issues (subject to availability), $8 per issue ($9 outside the U.S.), send check or money order to Back Issues Dept., Ziff-Davis Inc., P.O. Box 53131, Boulder, CO 80322-3131. Additional information on advertised products can be requested online at *www.pcmag.com/ProductLink*.

PC MAGAZINE CD

PC Magazine CD, the interactive CD-ROM companion to *PC Magazine*, is available quarterly. To order ($49.95 per year in the U.S., $72 in Canada, $99 elsewhere), please call 800-335-1195, or 303-665-8930 outside the U.S. and Canada. Or write to PC Magazine CD, P.O. Box 59494, Boulder, CO 80322-9494.

PC MAGAZINE ONLINE

PC Magazine is on the World Wide Web (*www.pcmag.com*) and The Microsoft Network (Go To pcmagazine). We operate PC MagNet, an on-line service of ZDNet, hosted by CompuServe. (For details, see the Utilities column.) *PC Magazine* subscribers receive free access to our online archives.

PERMISSIONS, REPRINTS

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article or use *PC Magazine*'s logo in conjunction with an Editors' Choice designation, write Chantal Tucker or fax her at 212-503-5475; for information on reprints, please contact Ziff-Davis Reprints at 800-825-4237.

The following are registered trademarks of Ziff-Davis Inc.: DOSMark, NetBench, PC, PC DIRECT, PC Labs, PC MAGAZINE, PC MAGAZINE AWARD FOR TECHNICAL EXCELLENCE, PC MAGAZINE EDITORS' CHOICE, PC MagNet, ServerBench, WinBench, Winstone, and ZD.

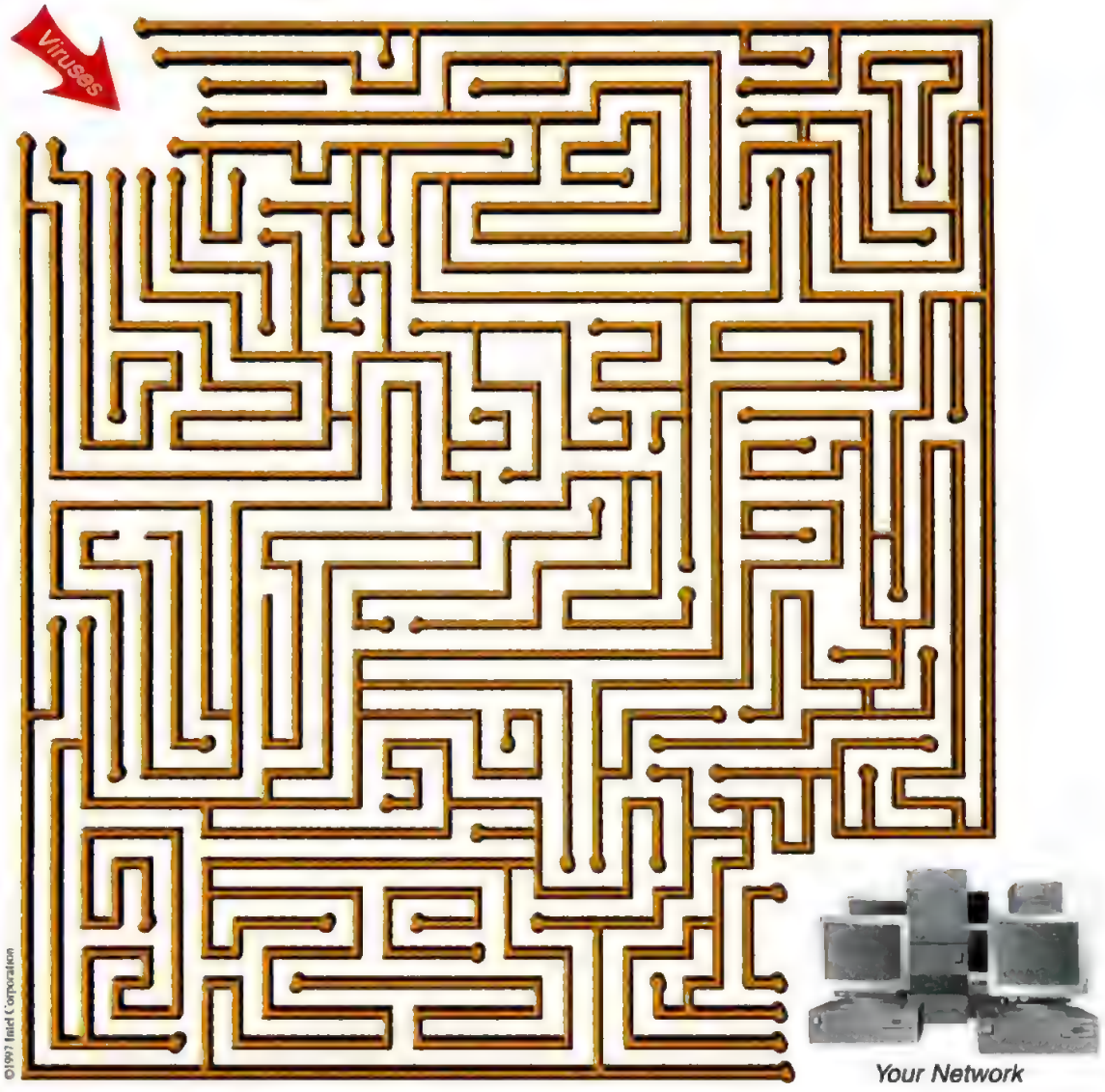
The following are trademarks of Ziff-Davis Inc.: Abort, Retry, Fail?, After Hours, BusinessCard, Corporate Developer, CPUmark, Extending Your Apps, Features Plus, First Looks, First Looks Plus, Lab Notes, New & Improved, OFF THE STACK, PC Bench, PC Magazine At Home, PC Magazine CD, PC Magazine Marketplace, PC Solutions, PC Tech, Pipeline, Power Programming, Quick Clips, Read Only, ScreenDemos, Tech Notes, Tutor, User-to-User, WinDrain, ZDigit, ZDNet, and ZiffNet.

Other trademarks and trade names used throughout the publication are the property of their respective owners.

Copyright (c) 1997 Ziff-Davis Inc. All rights reserved. Reproduction in whole or in part without permission is prohibited.

PRINTED IN THE U.S.A.

Frustrating viruses everywhere.



Multi-Layered Data Protection from Intel LANDesk® Virus Protect 5.0

Detection *The powerful scan engine in Intel LANDesk® Virus Protect provides continual detection of known and unknown viruses, including polymorphic, macro and stealth viruses.*

Protection *The Integrity Shield is the industry's first technology to prevent the spread of viruses from an infected station to the server. Integrity Verification technology combines pattern scanning and integrity-checking functions so that no infected files remain on your server.*

Central Control *Intel LANDesk Virus Protect provides true, centralized management with its multi-NOS, domain-wide configuration and maintenance, as well as single point control of client PCs and servers.*

Create an impenetrable maze with multi-layer data protection. Intel LANDesk® Virus Protect 5.0 combines detection, protection and central control technologies to defend your data from every conceivable angle.

From our Web site, download a free **Intel LANDesk Virus Protect Test Drive Kit**. Or for more information, give us a call at 1-800-538-3373, extension 231, to find out what multi-layer virus protection can do for *your* network.

▶ www.intel.com/network/LDVP.htm

intel®

MICRON TRANSPORT VLE

133MHz Intel Pentium® processor
16MB EDO RAM (40MB max.)
1.4GB hard drive
16X modular CD-ROM drive
Li-Ion battery
12.1" TFT SVGA, 800x600 display

STANDARD FEATURES

256KB L2 pipeline burst cache
PCI bus with 128-bit graphics accelerator
MPEG compatible
Zoomed video-ready
Touchpad pointing device
Microphone and 16-bit stereo sound
2-way infrared port
Modular floppy drive
Microsoft® Windows® 95 and MS® Plus!
5-year/1-year Micron limited warranty

$2,249
Bus. lease $77/mo

MICRON TRANSPORT XPE

133MHz Mobile Intel Pentium processor with MMX™ technology
16MB EDO RAM (80MB max.)
1.4GB removable hard drive
12.1" active matrix color display, 800x600

STANDARD FEATURES

256KB pipeline burst cache
PCI graphics accelerator, 2MB VRAM
8X modular CD-ROM drive
Pick-a-Point™ dual pointing devices
Microphone and 16-bit stereo sound
Motorola Montana 33.6 fax/modem
CardBus- and zoomed video-ready
2 infrared ports, S-video, NTSC, game port
Management and Executive Travel software pak
2 modular expansion bays
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
5-year/3-year Micron Power™ limited warranty

$2,999
Bus. lease $102/mo

MICRON TRANSPORT XKE

166MHz Mobile Intel Pentium processor with MMX technology
64MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display

STANDARD FEATURES

512KB L2 pipeline burst cache
128-bit, 2MB DRAM graphics
20X CD-ROM drive with AutoPlay™ technology
Pick-a-Point dual pointing devices
Microphone and 16-bit stereo sound
Integrated 33.6 Kbps modem, full duplex
CardBus- and zoomed video-ready
2 infrared ports, S-video, NTSC, game/MIDI USB port
Management and Executive Travel software pak
2 modular expansion bays
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
5-year/3-year Micron Power limited warranty

$5,599

Packs A Punch.

Get some zing with the Micron™ TransPort.™

What's small, sweet and gives you some punch?

A Micron TransPort notebook, of course. Our outstanding line of portable PCs offers impressive flexibility, tempting prices and the hottest features on the market.

High-end users will handpick the TransPort XKE. A true desktop replacement, we've loaded our XKE with a high-performance graphics accelerator, active matrix screen, upgraded CD-ROM, tons of memory and more. Our TransPort XPE fits the bill if you're looking for a top-grade computer for home, office or travel. And our TransPort VLX offers flexibility and sleek styling for a more-than-palatable price.

MMX intel inside pentium

Best of all, we back our products. Every day. When you buy Micron, you can custom configure your system to meet your needs, so it's homegrown, not mass-produced. When you buy Micron, you get the steadfast 24-hour support that we're famous for. And when you buy Micron, you get one of the best warranties in the business, from one of the best companies in the business.

If you're ready to pack a little punch, try a TransPort notebook.

Call now to order.

800-295-0564

www.micronpc.com

MICRON POWER WARRANTY

- 5-year limited warranty on microprocessor and main memory
- 3-year limited parts-only system warranty (1-year for TransPort VLO)
- 1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
- 30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
- 30-day money back policy
- 24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.

Micron Sales Hrs: Mon-Fri 6am-10pm, Sat 7am-5pm (MT) Technical Support Available 24 Hours A Day, 7 Days A Week. Toll free from Mexico: 95-800-708-1755 • Toll free from Canada: 800-708-1758 • Toll free from Puerto Rico: 800-708-1756 International Sales: 208-893-8970 International Fax: 208-893-7393

Designed for Microsoft® Windows®95

MICRON ELECTRONICS™

©1997 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice. Prices do not include shipping and handling and any applicable taxes. 30-day money-back policy does not include return freight and original shipping/handling charges. Lease prices based on 36-month lease. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

CONFIGURED FOR YOUR LIFE

CIRCLE 119 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

THE 90s:

SMALLER OFFICES.

LONGER HOURS.

After years of corporate downsizing, there's finally light at the end of the tunnel. And it's coming from the new DJ800 19" (18" VIS*), high-contrast monitor from MAG InnoVision.

That's because the DJ800 gives you everything you ever wanted in a large screen display. More real estate. Higher resolutions. And the envy of everybody you know.

Featuring an innovative dark-tint FST and advanced electron gun technology, the DJ800 delivers sharper images with higher contrast. Along with a 0.22mm horizontal dot pitch and pixel resolutions of up to 1600 x 1200. Plus, MAG InnoVision's exclusive one-touch JAG™ control and other features you've come to expect from the leader in color monitor technology.

Best of all, the DJ800 gives you all this for about what you'd expect to pay for a high-performance 17" monitor. And far less than what a 20" or 21" model would cost.

So check out the DJ800 today at your nearest MAG InnoVision Ultimate Reseller.

Then forget about climbing the corporate ladder and clamoring for that corner office. Set your sights on something bigger.

The new, high-contrast, 19" (18" VIS) DJ800 monitor from MAG InnoVision.

*Viewable Image Size.

Copyrighted material

LOWER PAY.

BIGGER MONITORS.

THINGS HAVE NEVER BEEN BETTER.

MAG INNOVISION

MAG InnoVision Co., Inc., 2801 South Yale Street, Santa Ana, CA 92704. Call: 714-751-2008 or 800-827-3998.
Fax: 714-751-5322. MAGic Fax-On-Demand: 714-751-0160. Web Site: www.maginnovision.com

CIRCLE 338 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM Product Info

You'll be amazed at what they come with. And even more impressed by what they go for.

IBM

Direct from IBM®

Aptiva™ E Series - E34

Powerful Yet Surprisingly Affordable

- 233MHz Processor
- 32MB SDRAM
- 4.3GB HD
- K56 Flex Protocol Modem*
- 256K L2 Cache
- 24X (max) variable speed CD-ROM
- SRS 3D Sound
- ATI Rage II+ Graphics Accelerator
- MPEG-1 Video
- Lotus® SmartSuite® 97
- Internet Browsers

$1699* $60/Mo+

14" Color Monitor (13.1" viewable) add $249
15" Color Monitor (13.6" viewable) add $349

Aptiva L Series - L31

The Ideal Family Multimedia System

- 15" Color Monitor (13.6" viewable)
- 233MHz Intel Pentium® Processor with MMX™ Technology
- 32MB SDRAM
- 4.2GB HD
- K56 Flex Protocol Modem
- 24X (max) variable speed CD-ROM
- MPEG-1 Video
- Sound by Bose®
- Arcade-level 3D Graphics Video
- Exclusive Aptiva Photo Director™ from IBM and Kodak®
- Exclusive IBM ScrollPoint™ Mouse
- EZ Button Keyboard
- Internet Browsers
- Lotus SmartSuite 97
- World Book Encyclopedia and more

$2329 $83/Mo

Aptiva S Series - S62

The Award-Winning Split-System Design with the Ultimate in Multimedia

- 15" Color Monitor (13.6" viewable)
- 266MHz Intel Pentium II Processor with MMX Technology
- 32MB SDRAM
- 6.4GB HD
- K56 Flex Protocol Modem
- 512K L2 Cache
- DVD-II with Movie Playback
- Sound by Bose
- ATI 3D Rage Pro
- Exclusive Aptiva Photo Director from IBM and Kodak
- Exclusive IBM ScrollPoint Mouse
- EZ Button Keyboard
- Internet Browsers
- Lotus SmartSuite 97
- World Book Encyclopedia
- MechWarrior Mercenaries and more

$3529 $125/Mo

Now when you purchase a new Aptiva, you can join IBM Owner Privileges,™ an exclusive membership program that delivers preferred service, unique advisory information, and special deals on accessories and software.

FREE Lexmark™ 1000 Color Printer
with the purchase of an Aptiva system and monitor when you order direct from IBM.*

To order directly from IBM, call:

1 800 426-7235, ext. 4223

Or visit us at www.ibm.com

Other Models Available
30-Day Money-Back Guarantee
Award-Winning IBM Service & Support
1-Year Limited Warranty

We're open 8am–10pm Monday–Friday, 9am–5pm Saturday (Eastern Time).

*Price represents Aptiva E34, monitor [illegible]. IBM Direct prices may vary. Prices do not include shipping and applicable taxes. Available only in the U.S. and Puerto Rico. Advertised in this advertisement ship with an operating system. †MHz only measures internal clock speed, not application performance. Many factors affect application performance. GB=one billion bytes. K56 Flex modems are designed to be capable of receiving data at up to 56Kbps from K56 [illegible] service provider, and transmitting at up to 33.6Kbps. Service providers currently limit maximum [illegible] speeds to 53Kbps. Actual [illegible] depend on many factors and are often less than maximum possible. Financing available on approved [illegible] issued and administered by MBNA America Bank, N.A. Payments based on 36-month term and [illegible] annual percentage rate. Estimated monthly payments do not include shipping and taxes. Payment [illegible] deferred for the first 90 days. Ask your IBM representative or call 1-888-495-6262 for details. [illegible] subject to change. Software may not include all documentation or function and may differ slightly from [illegible] versions. Not all products may be available separately. Owner Privileges is available exclusively to Aptiva owners. First-year membership fee of $100 is waived for purchasers who purchase and register their Aptiva from 9/15/97 to 3/1/98. Membership is valid for one year from date of purchase. Membership renewal may be purchased for $20 annually. Offer expires 12/1/97 or while supplies last. Offer valid with purchase of current IBM Aptiva E, L, S models. Not valid with purchase of refurbished models. Offer not valid with any other offer, promotion or discount directly from IBM. IBM and Aptiva are trademarks, registered trademarks or service marks of International Business Machines Corporation. Pentium and MMX are trademarks or registered trademarks of Intel Corporation. Other company product and service names may be trademarks, registered trademarks or service marks of their respective owners. Warranty, service and support of non-IBM products are provided directly to you by non-IBM manufacturer, supplier or publisher of the product. IBM makes no representations or warranties regarding non-IBM products. Some limitations apply. Call 1-800-772-2227 to obtain a copy of IBM's statement of limited warranty. © 1997 IBM Corporation.

Letters

PANDORA'S BUG

Michael J. Miller's editorial "The Anatomy of a Bug" (August 1997) glosses over a serious issue in the role *PC Magazine* played in the CaboComm/Netscape controversy. The cache files that Netscape Navigator creates are temporary copies of files that are downloaded by the program. These files are created to improve the program's performance.

If the "cache file" provided by *PC Magazine* to Netscape is a file authored by CaboComm, *PC Magazine* may have violated copyright laws by making a copy for Netscape. CaboComm owns the rights to the files that it authors, and unless *PC Magazine* was granted permission to distribute this file, it should not have done so. There is no need for a nondisclosure agreement to protect a work under copyright law.

PC Magazine could have satisfied the responsibility to its readers cited in the editorial by describing the undesirable behavior of the program without violating copyright laws. By also providing the file to Netscape, *PC Magazine* chose, in my view, to favor Netscape at a possible economic cost to CaboComm. Some companies may hesitate to provide *PC Magazine* a look at confidential information, preview copies of software, and such if they feel that this act reflects a cavalier attitude toward the intellectual property rights of others. I think a much stickier question to ask is whether this act is in the interest of your publication or its readers.

BRUCE STEWART
Astoria, New York

CaboComm spent considerable time and expense to verify a possible bug in Netscape 3.01 on its own, without any previous arrangement or contract with Netscape. For it then to say "give us what we want or we will go public" is extortion. A simple contract with Netscape stipulating no payment unless verifiable critical bugs were documented is all it would have taken. Since CaboComm had no promise of monetary reward, for you to state that "there is no right or wrong answer" is absurd.

TIM PROCUNIAR
Bellbrook, Ohio

Someone finding bugs to improve the software's integrity is fine. If people are finding bugs because they want money, they should find an occupation that pays them to find bugs and agree on the salary up front so that there is no disappointment. Therefore I agree with Netscape that it is inappropriate to request more money than the amount that was offered for the discovery of the bug.

LISA O'ROURKE
Washington, New Jersey

"You serve your readers better by providing solutions than by pointing out problems."

I agree with Miller that *PC Magazine*, as usual, performed a service for readers and computing generally. What apologies could possibly be owed Netscape? To whom, after all, did Netscape turn first for access to unbiased, state-of-the-art testing equipment? And who provided Netscape with the lead to resolve the problem?

PAM ROLPH
San Francisco, California

I strongly agree that *PC Magazine's* first responsibility is to its readers, although I feel that you serve them much better through your long tradition of providing robust solutions rather than pointing out only the problems. The broken parts of software do no one any good (especially one with security implications), and the sooner they are fixed, the better off all users (your readers) will be. In my opinion, you chose wrong to use this information as a tabloid headline rather than following your respected tradition as a partner in solutions to a complex world.

WILLIAM A. BARTLING
Houston, Texas

PIM TALK

I am quite aware that reviewing personal information managers is extremely difficult. I also know that, once one has adopted a PIM, one becomes a staunch advocate of that PIM. Nevertheless, it seems to me that the review of Commence 4.0 ("Get It Together: Information Managers," August 1997) does not appropriately represent its strength and versatility. I also think that the review exaggerates the level of difficulty in using Commence.

I have been a Commence user for several years, and no other PIM (Ecco included) could do what I have requested of Commence. No other PIM offers the level of data integrity or the quality and speed of technical support (including an extremely helpful CompuServe forum) that Commence offers. In six years of using Commence, I never encountered any type of data corruption.

BENOIT GAUTHIER
Hull, Quebec, Canada

I am not surprised at your unenthusiastic review of Info Select 4.0 as a PIM. Micrologic may market it as such. But it is really a different kind of tool altogether. As an academic author and teacher, I used to accumulate endless mounds of research notes on index cards. My files grew so large and unwieldy that I often lost track of an item for which I had a critical need. For researchers like me, the capability to organize and retrieve data that Info Select provides rivals the word processor itself in terms of practical and efficient means of information management. Perhaps you should do a piece on computing tools for academic research sometime.

IRA J. COHEN
New Brunswick, New Jersey

CAN YOU DEFINE "BEST"?

Thanks to John C. Dvorak for being honest about the nature of computer companies in both his August 1997 column ("Best Way or the Highway") and Inside Track. Something tells me that there is a major shift coming in the nature of these computer giants that will affect everyone who can't work without a computer. For all the advances in computing over the past decade and a half, I have the strange feeling that we are moving backward, because we actually have fewer choices that we can count on. Without a strong Apple, Microsoft lacks enough competition to follow a "best way" practice. Where is this really going? Who is going to survive? And what company will emerge as the computer maker that follows a "best way" to the customer's expectations?

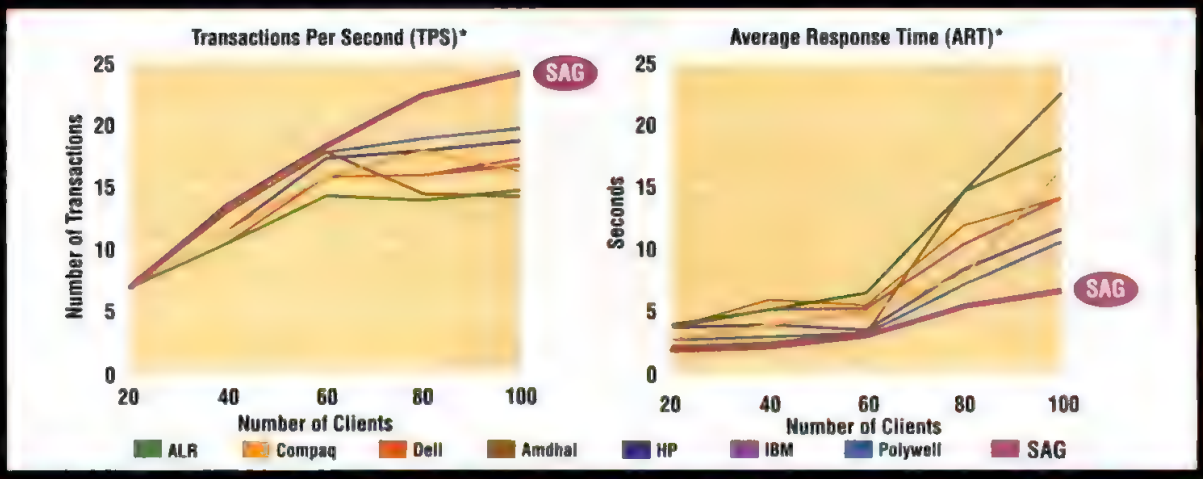
ED BRENEGAR
Hendersonville, North Carolina

Dvorak's column "Best Way or the Highway" is provocative, but I think he misses what's possible in proposing what's not. It's often relatively easy to point to things that don't work well, and I agree with some of his examples. However, in my experience, it's usually impossible to get a roomful of people to agree on anything being the "best" of its kind.

MICHAEL BROOMFIELD
via the Internet

"SAG offers the best

NETWORK COMPUTING PRODUCT TESTING RESULTS*



SAG Electronics proved to be the performance champ in an independent test by Network Computing. Going against the biggest names in the industry, "SAG offers the best price/performance." Proving if performance (and price) counts in your business, you can count on SAG.

*Dual Pentium Pro RAID 5 Server

SAG's Dual Pentium Pro RAID 5 Servers 6/1/97

Fastest CAD Card Available!

Alpha 500 Server 7/1/97 8/1/97 9/1/97

PC Computing THE A LIST

WORK STATIONS

STA DUAL PENTIUM 300 MHz CAD	STF PENTIUM II DUAL 266 MHz	STA CLIENT PENTIUM 200 MMX	STA ALPHA 533 MHz
• Intel Pentium 300 MHz CPU Upgradable to 2 CPUs • 64MB of RAM Expandable to 512MB, ECC Supported • Symmetric 40MB MX Open GL Video • Slots: (6) PCI, (2) ISA • Integrated Dual Channel Ultra Wide Controller Upgrade Path to Raid 5 • Sony 24x CD-ROM • 9.1GB 10,000 RPM UW Removable HD • JAZ 1GB Removable • Keyboard, Floppy, Mouse • Tower Case	• 1 Intel Pentium II 266 MHz Processor, Upgrad. to 2 CPUs • 512K Cache • Slots: (5) PCI, (4) ISA • 64MB of RAM Expandable to 512MB ECC Supported • #9 Revolution 8MB Video • Adaptec 2940 UW • 4.3 GB Ultra Wide IBM 8.5 ms • Sony 24x CD-ROM • Keyboard, Floppy, Mouse • Tower 300 Watt Power	• 1 Intel Pentium 200MMX CPU • 32MB RAM, Expandable to 128MB • Seagate 2.1GB IDE • #9 772 4MV-RAM, Video • Sound & Speakers • Sony 24x CD-ROM • Keyboard, Floppy, Mouse • Mid Tower Case	• 1 Dec Alpha 533 MHz CPU • 1 MB - SRAM Cache • 64 MB of Memory • 4.3 GB 10,000 RPM UW Removable HD • Adaptec 2940 UW • #9 Revolution 8MB Video • Sony 24x CD-ROM • Keyboard, Floppy, Mouse • Tower Case 300 Watts
$5859 Symmetric 16 & 8MB Video Available	$2595 $2450	$1183 Intel Land Desk Option Available DMI Compliant	$4499 8,16 & 40MB Open GL Video Cards Available

Hours 8:30am - 7:00pm • North Andover, MA

Fax 508.689.0180 GSA Schedule: GS-35F-3103D

AT&T on-site and 4 year extended warranties are available. Lease options available. Returns may be subject to restocking fee. RMA # must be acquired. Some devices have not been approved by the Federal Communications Commission. These devises are not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained.

MORE AWARDS

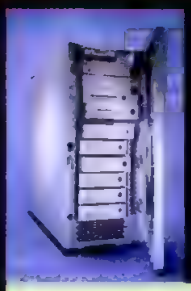
PC EDITORS' CHOICE 9/24/96 SAG STA Pentium Pro 200

PC EDITORS' CHOICE 2/20/96 SAG STF 166 Pentium

PC EDITORS' CHOICE 2/20/96 SAG STF 150 Pentium

price/performance."

Network Computing June 1, 1997



SERVERS, RAID 5 SUBSYSTEMS & STORAGE SOLUTIONS

The STF Line is our high end built to order product line. Each system is specifically designed for each customer, solving the issues of price, performance, reliability (fault tolerance), growth and ease of use. Our specialty in RAID technology has produced servers that are unique in the industry. Each features on-line storage expansion for hassle-free growth. Our boot-up configuration allows [illegible] to all major O/S using GUI RAID Manager. Every server supports 15 drives per channel with up to [illegible]. And a powerful [illegible] gives the best performance in the industry.

STF RACKMOUNT QUAD

- 2 Intel Pentium Pro 200 MHz Exp. to 4
- 512K Cache
- 128MB of ECC 4 way Interleaved Memory to 1GB
- Slots (6) PCI; (4) EISA
- 9.1GB 10,000 RPM Ultra Wide Removable HD
- #9 2MB DRAM Video
- PILA8465B Ethernet 10/100
- Sony 16x CD-ROM
- Keyboard, Floppy, Mouse
- Rackmount Case with Redundant Power
- Server Management Software and Alarm Option Available

$9800

File Server Cases Available

STF DUAL PRO 200 MHz

- 1 Intel Pentium Pro 200 MHz Processor Upgradable to 2 CPUs
- 256K Cache
- 64MB of RAM Expandable to 1GB
- Slots: (5) PCI, (4) ISA
- PILA 8465 B Ethernet
- 9.1 GB 10,000 RPM UW Removable HD
- Adapter 2940 UW
- #9 2MB Video
- Keyboard, Floppy, Mouse
- Sony 16x CD-ROM
- Tower Case 300 Watt

$3128

Server Management Software & Alarm Options Available

STF PENTIUM II 300 MHz RAID 5

- 1 Intel Pentium 300 MHz CPU Upgradable to 2 CPUs
- 64MB of ECC RAM Expandable to 512 MB
- Integrated on Board 2 Channel, RAID 5 Controller, 2MB PCI Video
- Open Slots: (6) PCI, (2) ISA
- Q (3) 4.3GB 10,000 RPM UW Removable HD
- Sony 16x CD-ROM
- Adaptec 10/100 PCI Ethernet
- Keyboard, Floppy, Mouse
- 13 Bay Tower with 400 Watt Redundant Power Supplies
- Server Management Software

$6499

RAID 5 FOR ANY COMPUTER SYSTEM

STC2000 20 BAY REDUNDANT ULTRA CONTROLLER SOLUTION

- Q: 2 3-Channel RAID 5 UW Controllers

Both controllers are ACTIVE, giving ultimate performance. If one fails, the remaining controller automatically performs all functions.

This gives the user the ultimate in performance and safety!

- 20 Hot-swappable Drive Bays
- 8 230 Watt Hot-swappable Redundant Power Supplies
- Sensor Panel Monitors:
  - Internal Temperature - Status of Individual Power Supplies
  - Status of Individual Cooling Fans - Visual and Resetable Audible Alarm
- 128 MB of Cache

STC7000 RACKMOUNT SOLUTION

- 3-Channel RAID 5 UW Controllers • 6 Hot-swappable Drive Bays
- 2 300 Watt N+1 Hot-swappable Redundant Power Supplies
- Sensor Panel Monitors: - Internal Temperature - Status of Individual Power Supplies - Status of Individual Cooling Fans - Visual and Resetable Audible Alarm

STC8000 RAID 5 SOLUTION

- 3-Channel RAID 5 UW Controllers • 8 Hot-swappable Drive Bays
- 2 300 Watt N+1 Hot-swappable Redundant Power Supplies
- Sensor Panel Monitors: - Internal Temperature - Status of Individual Power Supplies - Status of Individual Cooling Fans - Visual and Resetable Audible Alarm

STC2000 72GB Solution	STC2000 72GB Solution	STC2000 32GB Solution	STC7000 or STC8000 17GB Solution	STC7000 or STC8000 18GB Solution	STC7000 or STC8000 27GB Solution
Q: (8) 9.1GB 7200RPM UW HD	Q: (8) 8.1GB 10,000RPM UW HD	Q: (8) 4.3GB 7200RPM UW HD	Q: (4) 4.3GB 7200RPM UW HD	Q: (4) 4.5GB 10,000RPM UW HD	Q: (3) 9.1GB 7200RPM UW HD
$22289	$24132	$18867	$7671	$8253	$8240

SEE OUR WEBSITE FOR A COMPLETE LINE OF OUR DISK STORAGE SOLUTIONS

www.sagelec.com

1.800.989.3475

SAG ELECTRONICS

The Intelligent Choice.

CIRCLE 309 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Letters

In Dvorak's discussion of the various interfaces we have had to deal with over the years ("Best Way or the Highway") I find it interesting that the "dopey browser interface, which is not much more than two arrows and a stop sign" (and a home button) is very similar to the original Hypercard interface. As Dvorak implies in his column, soon after the introduction of Hypercard, a user interface revolution ensued. Given the history of the user interface (UI) and Microsoft's track record, Microsoft is in the process of an interface shakedown. We are headed toward a renegade UI where the user or the content pushers decide what the "best" UI is.

MICHAEL SERRANO
via the Internet

SHALLOW GUIDES

I enjoyed your article on city guides ("Think Globally, Surf Locally") in the August 1997 issue. These guides can provide useful information but lack depth because they try to cover too much. I get the impression that many are slammed together and are not yet mature. Americans are notoriously parochial. Newspapers exemplify this by devoting much of their content to local stories and news. This makes the Chicago papers of very little interest to a San Francisco visitor. This is the niche market *USA Today* serves: It provides thin general news coverage for the traveler. Is this the role that most of the city guides are trying to fill?

KEN HOLMES
via the Internet

While I found your article comparing different local information providers interesting, I noticed that the reviews were written by different people. I think one should get the same person's perspective of each site because that's the only true way to provide a comparison. Having explored the services available today, I find that some of them are comparable while others are vastly different. Some offer material produced in-house, while others offer Yahoo!-like aggregates. It seems as though this information might have been better if it were separated into two articles: one to compare how local in-house information providers are handling this new idea and one to compare the local aggregate sites.

ALEXANDRA RAPP
San Diego, California

PORTABLE PROBLEMS

I had hoped that the article in August 1997 issue entitled "Portable Desktops" would help me choose a new laptop, but it seems the testing left out what now is the most important issue to me: whether or not the laptop can actually be used as a laptop. After several months of looking, I decided on an NEC Versa 6000 because it had a reasonable weight (6-plus pounds), a layout that was physically well balanced so that it would be easy for me to pick up with one hand (I get around in a wheelchair and have to hold onto the chair with one hand while picking up things with the other) and have all of the options I wanted. Unfortunately, the laptop had a big flaw: a temperature of 142° F across the entire bottom. After exchanging it twice, I still had the same problem. NEC then admitted that there was a problem, but after many struggles to get the notebook fixed I just got a refund.

MARIANNE ADES
via the Internet

You left out one very important piece of information in your coverage of 60 new notebooks: OS/2 compatibility. You do not indicate which ones support my choice of OS.

BOB STEPHAN
via the Internet

Your notebook roundup was good but missed one important detail: You didn't tell us what version of Windows 95 shipped with each machine. My Micron desktop PC, purchased before Christmas 1996, came with OEM Service Release 2 (OSR2), the most recent and powerful version of Windows 95. So did the Micron TransPort notebook my company bought for me in February 1997. Though it was an excellent machine, I returned it because of a dim screen. The Dell I replaced it with is excellent, but unfortunately it came with an earlier version of Windows. Your readers want to know what operating system they're getting—and there is a difference.

JOE CRUMLEY
Minneapolis, Minnesota

CONTROVERSY OVER ACCESSIBILITY

I usually find myself agreeing with Bill Machrone, but not in his column "Finally: Accessibility for Windows" (August 1997). The displayed quote in the middle of the page is "Where's it written that you need ten working digits, two good eyes, and sharp hearing to use a PC?" My answer is that it's practically the nature of the beast. I do not wish to disparage the abilities of disabled individuals; I simply must react against Machrone's claims. His statement that "accessibility is hard work, but ultimately it's a win for everyone" is absurd. He is correct that it is hard work, but it benefits only a very select few in society. Why should I, as a software developer, shoulder the additional burden of MSAA (or other specifications) when the market for it is so terribly small? Frankly, I resent being told by Microsoft, the U.S. government, or anyone else—except the paying customer—what my software needs to do.

JOHN B. WILLISTON
via the Internet

There is a huge gap in all the discussions regarding accessibility. People with limited vision (not necessarily blind) or those who need to wear glasses are potential customers. There seems to be no good reason why their needs can't be addressed. Special animation, video chips, and drivers allow screens to be refreshed at even faster speeds, with more colors and higher resolution on larger displays. But none of this has translated into making it easier to see with poor eyes.

JOHN DAVIS
via the Internet

CORRECTIONS AND AMPLIFICATIONS

In our September 9, 1997, First Looks article, the credit for the images displayed in the photographs of the LCDs should have read, "Screen images © The Stock Market/William Westheimer."

Transmonde Technologies' Vibrant 166TMX, reviewed in "Portable Desktops" (August 1997), performed significantly below the average of other MMX/166 systems on repeated test runs. After we returned the unit, Transmonde said it was unable to duplicate our test results, so we took the same review unit back for further testing. On retesting, PC Magazine Labs obtained significantly higher scores for the unit: a ZD Business Winstone 97 score of 39, which is well above average, instead of the initial 25, and a $CPUmark_{32}$ score of 344 instead of 144. Because we were unable to duplicate the abnormally low initial scores, we believe the retested scores are indicative of the typical performance of the Vibrant 166TMX. Transmonde Technologies is affiliated with ASE, not ASC, as we incorrectly stated.

HOW TO CONTACT US

We welcome your comments and suggestions. Please send Letters to the Editor via

E-MAIL pcmag@zd.com

FAX 212-503-5799

MAIL Letters, *PC Magazine*, One Park Ave., New York, NY 10016-5802

COMPUSERVE To reach individual editors as listed on ZDNet, type GO PCMSTAFF.

All letters become the property of PC Magazine *and are subject to editing. We regret that we cannot answer letters individually. To send submissions for PC Solutions, please see the sidebar "How to Contact Us" on the last page of that column.*

ROCKET SCIENCE XIRCOM STYLE.

The fastest LAN connection. The fastest modem connection. Your notebook is in for the ride of its life. We've just created the only PC Card that combines a 10/100Mbps Ethernet adapter with a high-speed 56Kbps* modem, for virtually the same cost as the 10Mbps CreditCard Ethernet+Modem 33.6. This enables you to have an Ethernet+Modem PC Card today, with speeds that'll meet your needs in the future. Plus, it's flash upgradable to the future 56K ITU standard. And thanks to GlobalACCESS™ you can enjoy fast, reliable connections all over the world.

The Xircom CreditCard Ethernet 10/100+Modem 56 is equipped with innovative K56flex™ technology, which is supported by over 650 ISPs and more than 700 leading remote access equipment

INTRODUCING ROCKET FUEL FOR YOUR NOTEBOOK.

manufacturers such as Ascend Communications, Bay Networks and Cisco Systems. In fact, you'll receive a free 10/100+56 PC Card from us when you purchase K56flex-enabled products from any one of these three manufacturers anytime between August 1 and December 31, 1997.**

ASCEND

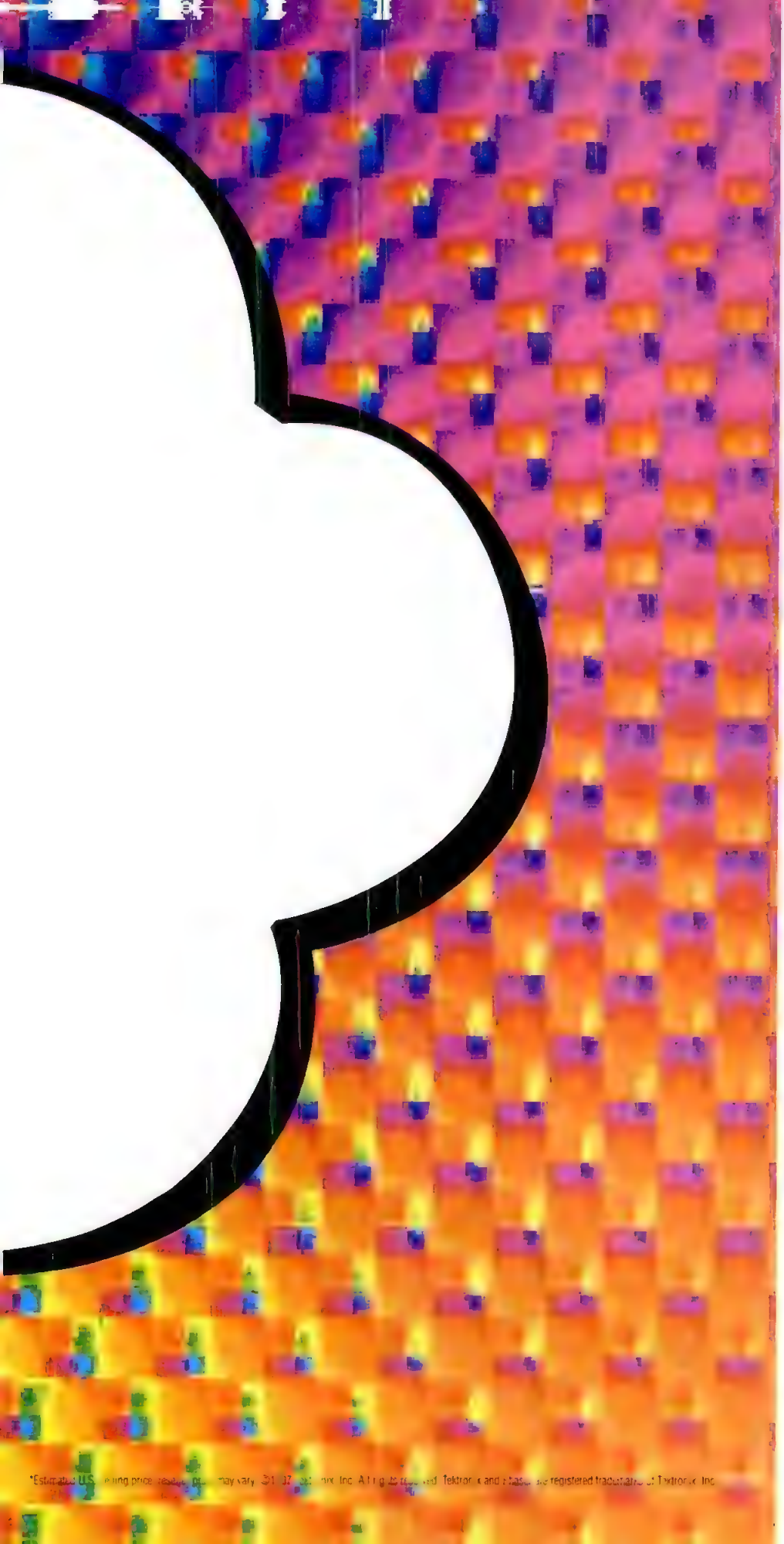
Bay Networks

CISCO SYSTEMS

We also offer world-class phone and online services for support, not to mention a limited lifetime warranty and a 30-day money-back guarantee. Call us at 1 (800) 438-4526 for details on our free offer and evaluation program or visit www.xircom.com. And resellers – be sure to call your distributor for introductory pricing offers. But hurry. They're going really, really fast.

Xircom
The Mobile Networking Experts.

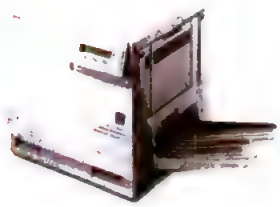
*56kbps refers to server download speed only, and requires compatible modems at both the user and server sites. Download speeds of 56k are currently unavailable in the U.S. Other country-specific regulations may impose similar limits. Additional technical information on K56flex™ performance can be found at www.xircom.com/56. **Free offer good in U.S., Canada and Latin America. Qualifying products can be found at www.xircom.com. Limit one per company while supplies last. ©1997 Xircom, Inc. Xircom is a registered trademark of Xircom, Inc. All other brands and product names are trademarks or registered trademarks of their respective companies. Xircom U.S. Headquarters: (805) 376-9300. Xircom Europe NV: +32 (0)3 450.08.11. Xircom Asia: (65) 323-1511. Xircom in Canada: (800) 565-3284. Xircom in Latin America: (888) 4LATINKEP



SO WHAT'S YOUR IDEA OF GREAT COLOR?

It really doesn't matter if you're talking a primarily red, yellow and blue presentation or a polychrome universe with a gradient filter and glass distortion like this. You can get a real laser class printer — with vibrant Tektronix® color — to match your artistic heart as well as your business head. From the workhorse, workgroup Phaser® 350 printer with a bottom line price of $2,995.* To the high-speed, full 1200 dpi Phaser® 560. All the way up to the graphic arts photo-realistic printers that have made Tektronix a color standard. So however you see color, just remember this. If you can dream it up, we've got a way to get you there.

To show off your own idea of color, just call us at 1-800-835-6100 ext. 1524, or visit us at www.tek.com/CPad?1524



Tektronix®

*Estimated U.S. selling price ... may vary. ©1997 Tektronix, Inc. All rights reserved. Tektronix and Phaser are registered trademarks of Tektronix, Inc.

Trends

ILLUSTRATION BY TERRY MARKS

One-Stop Utility Shop

Electricity, cable, phone, and Web access from one company?

Will your electric company be your next Internet service provider? If you live in Boston, Raleigh, Norfolk, or Washington, D.C., it just may. In September, Potomac Electric Power Company (Pepco), which provides electric power to the Washington, D.C. metropolitan area, plans to break ground on a high-speed fiber-optic network that will deliver Internet access, phone, and cable TV to residents. In fact, progressive utility companies around the country are repurposing their existing underground fiber-optic networks and beginning to lay thousands of miles of new cable for lightning-fast Internet access at speeds up to ten times ISDN's (128 Kbps). The prospect has some Internet service providers nervous.

With the Telecommunications Act of 1996, the Federal Communications Commission opened the doors for public utilities to offer both energy and telecommunications services. Now that local electric companies have the go-ahead to conduct business outside of their core services, the Internet-access business could become very interesting in the next few months: More utilities are partnering with telecom companies to offer packages of energy, telecom, entertainment, and even home-security services.

What do you gain by getting Internet access through your utility company? Convenience, mostly. One customer service department can supply all your energy and telecom needs. Service bundles are also likely to bring costs down. At around $35 a month, high-speed Internet access will cost less than what ISDN and T1 cost today and be more in line with the pricing of Internet access over cable.

The utility companies are uniquely positioned to offer telecom services for several reasons. First, since they own the utility poles, they own the valuable rights-of-way to customers. Second, many power companies are already in the telecom business: They entered it back in the 1980s, prior to the Telecom Act, when they built high-capacity (622-Mbps to 2,488-Mbps) fiber-optic networks that enabled them to monitor power grids and transmit information internally on power usage. Many power companies got into the business of selling fiber wholesale to phone companies. As a result, today they're sitting on underutilized—and extremely valuable—fiber capacity.

THE THREATS AND OPPORTUNITIES FOR ISPS

Market research firm Gartner Group predicts that brand-name Internet providers such as AT&T WorldNet and the regional Bell operating companies will virtually crush the 4,500 ISPs operating today in the United States. And if that's not enough to worry about, the ISPs may also have to contend with the brand-recognition and long-term relationships that customers have with their electric companies. Since the utilities have a lock on providing electricity to their customers, they can give other services away practically for free and make it harder for customers to leave. But the utilities aren't likely to put ISPs out of business anytime soon. "The utility companies don't have the expertise in Internet support. There's an opportunity for local and national ISPs to get into a good relationship with them," says Stuart White, general manager of SpryNet.

Power companies across the nation have already started to spin off subsidiaries and form joint ventures to enter the telecom business. Carolina Power & Light uses its subsidiary CaroNet to offer Internet access and market excess bandwidth on an extensive fiber-optic network that runs through Raleigh and Research Triangle Park and hooks into so-called "rings" that reach into Miami, Texas, and Arkansas. In a joint venture with RCN Corp. of Princeton, New Jersey, Pepco plans to provide Washington, D.C.–area customers with a package of utilities that includes local and long-distance telephone, cable television, and Internet access to homes equipped with "fiber" modems.

KN Energy in Lakewood, Colorado, and PacifiCorp in Portland, Oregon, recently teamed up with MCI to offer a package of services that supplies gas, electricity, long-distance telephone service, cellular and paging services, appliance warranty, purchase and repair, home-safety products, Internet access, and satellite television to ten states in the Northwest.—*Carol Levin*

PROGRESSIVE UTILITIES

Several utilities are now offering or plan to offer both electricity and telecom services, including Internet access

KN Energy, PacifiCorp, MCI (Simple Choice)
Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming

PECO Energy and UtiliCorp United (EnergyOne)
Philadelphia area, southeastern Pennsylvania

Central and South West Corp. and ICG Telecom (ChoiceCom)
Arkansas, Louisiana, Oklahoma, Texas

Carolina Power & Light (CaroNet)
North Carolina (Raleigh Research Triangle Park)

Utilicom and Bangor Hydroelectric
Bangor, Maine

Utilicom and Clay Electric Cooperative
Jacksonville, Florida

Virginia Power
Washington, D.C., to Norfolk, Virginia

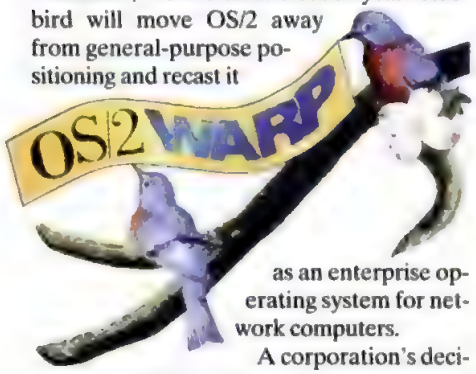
Boston Edison and RCN Corp.
Boston area

Pepco and RCN Corp.
Washington metro area

A Bluer OS/2

IBM repositions its operating system to run network computers.

You don't hear much about OS/2 anymore, but IBM wants to change that. The company is completely repositioning the operating system with a new version of OS/2 server and client software, dubbed "Bluebird," due at the end of this year. Bluebird will move OS/2 away from general-purpose positioning and recast it



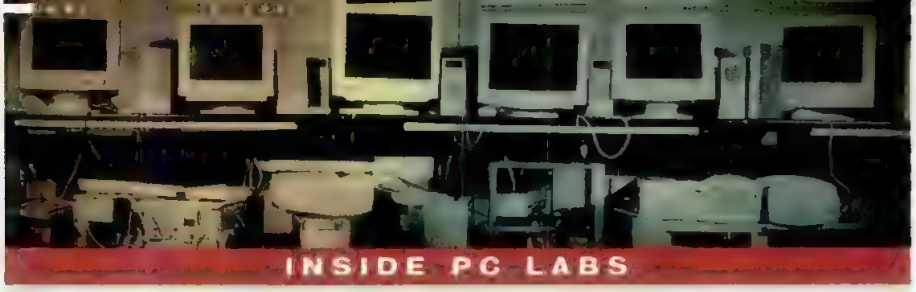
as an enterprise operating system for network computers.

A corporation's decision to go with thin-client network computers brings a series of choices, says Anthony Brown, the business line manager for network computing technology at IBM's Personal Software Products Division. Brown says that network managers looking to install network computers want to run DOS applications, 3270 mainframe applications, Java applets, 16-bit Windows applications, and more on the same network where the server—not the client—handles nearly all the work. Bluebird won't support 32-bit Windows applications directly, but emulation software will be available. Nor will Bluebird support Universal Serial Bus (USB), Advanced Graphics Port (AGP), and FireWire standards.

Bluebird will ship in either the late third quarter or fourth quarter. The server component will include management functions, tools, and utilities. The client component will be a thin, browser-based variation on existing client OS software. The client desktop will be malleable, so one user might have a Netscape desktop while another might have an OS/2 desktop. Bluebird will manage the desktops centrally so that users can pull up their desktops from any network computer connected to the server.

Microsoft is pursuing a similar goal with both its Zero Administration Windows initiative and its upcoming Hydra version of Windows NT. The Hydra operating system, in particular, is designed to make client software installations little more than browser-based shells that run on new, possibly diskless Windows-based terminals while the server software handles all the real work. —*Sebastian Rupley*

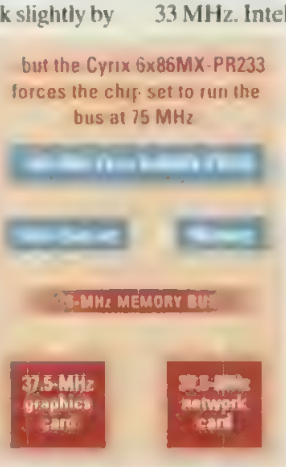
ILLUSTRATION BY LORA MORGENSTERN



Does Your PC Run Out of Spec?

THOUGH COMPETITION IN THE CPU MARKETplace is healthy, it can certainly make your PC buying decision difficult. The latest complication: Some early adopters of the Cyrix 6x86MX chip are now mixing Intel and non-Intel chip sets, which raises reliability issues that PC Magazine Labs has tried to address.

In our First Looks section of September 23, 1997 ("Affordable Desktop Power"), we reviewed five machines based on the new 6x86MX-PR233 chip from Cyrix, one of the first mainstream PC processors to use a 75-MHz memory bus. Since the debut of the 60-MHz Pentium four years ago, all new Intel chips have used either a 60- or 66-MHz bus—even though CPU clock speeds have increased more than four fold. Cyrix has widened this obvious bottleneck slightly by using a 75-MHz bus with the 6x86MX-PR233, but there are several issues that buyers should be aware of before purchasing certain systems that use the chip.



A PC's memory bus is a bridge from the CPU to main memory and various local buses. Most hardware peripherals run off a PCI local bus, which is designed to operate at half the speed of the memory bus. With the traditional Pentium architecture, the memory bus operates at 60- or 66-MHz and the PCI local bus runs at 30- or 33-MHz.

Cyrix is using a faster—albeit only slightly faster—memory bus. Third-party vendors such as VIA and SiS have designed new chip sets (the core technology that connects the CPU to memory and manages I/O access) for the 6x86MX that provide memory-bus speeds of 75-MHz. (The speed of the local PCI bus remains at 33 MHz, as prescribed by the PCI spec).

Some 6x86MX motherboard manufacturers—such as FIC and Asus—are forgoing the VIA and SiS offerings and opting for Intel chip sets, which are typically more advanced despite their slower speeds. These Intel designs, however, are not meant to run the memory bus faster than 66 MHz. When third parties ratchet bus speeds up to 75 MHz, not only is the Intel chip set operating against spec, but so is each of the system's PCI peripherals. The local PCI bus runs at 37.5 MHz—half the bus speed—not the standard 33 MHz.

According to Intel, running its chip sets out of spec could cause them to fail, and it could also create problems with your PCI peripherals because most PCI cards can operate at 37.5 MHz but are qualified to run only at 33 MHz. Intel's position on this issue may be a means of discouraging the use of a competitor's chip, but the company does know its own chip sets better than anyone else.

In testing at PC Labs, an Intel 430TX-based system from Sys Technology—whose peripherals ran out of spec at 37.5 MHz—was the leading 6x86MX performer. It had an unfair advantage, however: a 10,000-rpm SCSI drive. Machines from Polywell and CyberMax—each of which used the SiS 5571 chip set and ran peripherals at an appropriate 33 MHz—produced results that were almost as high despite their 5,400-rpm IDE drives.

Asus, Cyrix, and FIC—having done their own testing—do not foresee any problems running the memory bus at 75 MHz on an Intel chip set, but purchasing a 6x86MX machine whose chip set is designed to run the CPU is the safer option.—*Cade Metz*

The Road to Riches

Computer pros get top-notch salaries.

Forget Plastics. *The Graduate*'s Benjamin Braddock should have opted for a career in information technology. Unusually strong demand for skilled IT professionals has created a severe shortage of workers across a wide range of industries, according to researchers at the Stanford Computer Industry Project (SCIP). And the fact that top colleges and universities in the U.S. aren't producing enough qualified graduates is making the problem worse, say industry observers.

Since its inception some two decades ago, IT has seen unparalleled growth, according to a report from the Information Technology Association of America (ITAA). The industry currently employs 2 million people in the United States in a wide variety of positions such as software developer, operating system consultant, network manager, and customer support technician. And with new technologies sprouting daily—particularly those related to the Web—that number is expected to increase.

The industry faces a formidable challenge in filling these positions. At Stanford University, one of the top science and engineering schools, the number of graduates who have computer science degrees dropped by about 40 percent from 1986 to 1994. That trend has changed in the last couple of years: In 1995, the number of computer science graduates increased 5 percent from the previous year, and in 1996 it rose about 40 percent. Yet according to SCIP, even at that rate, in the year 2000 Stanford will still graduate the same number of students with computer science degrees that it did in 1986.

The need to employ skilled labor, along with the shortage, has created stiff competition among companies and a subsequent gold rush for employees. The nation's big high-tech companies, including Microsoft and Intel, are spending millions to recruit qualified candidates and are offering handsome salaries. Currently, a Stanford University graduate with a bachelor's degree in computer science can expect to earn a starting salary of $45,000; a graduate with a masters can expect $60,000. A masters or a doctorate in electrical engineering can command $57,200 and $75,000, respectively. And with about 96,000 IT positions currently vacant, says ITAA, salaries are likely to skyrocket even further.—*Angela Hickman*

ILLUSTRATION BY AMIT TRYNAN, PHOTOGRAPH BY SHONNA VALESKA

JAKE KIRCHNER

When It Comes to the Web, the ACLU is Clueless

The recent American Civil Liberties Union paper on free speech on the Internet is a must-read for anyone interested in the Web. It's a perfect example of how wrong-headed some people are—and how the knee-jerk anti-censorship crowd is making it harder to limit children's access to harmful information online. Limiting such access, they fear, will hinder the development of the Internet and pave the way for overzealous government regulators.

Although I rarely find myself in disagreement with the stances that the ACLU takes, I have to say right off that I find every part of its position on this matter illogical, confused, and technologically illiterate. But judge for yourselves; you can find the document at *www.aclu.org*.

First off, I hate the incendiary tone of this paper, entitled "Fahrenheit 451.2: Is Cyberspace Burning?", which immediately equates any effort to restrict access to the Web (or filter out any Web-based information) to book burning. Parents trying to keep from their children some of the degrading, biased, and inaccurate information that exists on the Web are not Nazis, and casting them in that light is counter to reasoned argument on an important topic.

The ACLU maintains that voluntary Web-site rating methods or automated filtering programs are harmful because they make getting "valuable speech" online more difficult. Rot! Since when have all forms of information had equal public access? Why must that hitherto unnecessary standard be preserved on the Internet?

I don't mind that there are sections in bookstores and libraries and on television channels that are devoted to safe sex and gay and lesbian matters—to use the "valuable speech" examples the ACLU raises. And I don't really mind that there are pornography stores in some areas of town.

But we put limits every day on the kind of information we access and the kind of information we let our children access. We choose which section of the library and bookstore to take books from. We decline to subscribe to sexually explicit cable channels. We rely on local zoning codes to keep porn shops away from our grade schools. And just about every parent relies on voluntary movie ratings for help in deciding which movies to let kids see.

These are reasonable compromises between free speech and good parenting. Similar compromises that don't infringe on the rights of people to produce and access information and yet don't make it impossible for parents to protect their children should be available on the Web.

The ACLU, however, views any such accommodation as dangerous. It says that self-rating proposals are "no less offensive to the First Amendment than a proposal...that everyone engaged in a street-corner conversation rate his or her comments." The analogy, typical of the intellectually lackadaisical arguments in this document, is ludicrous if for no other reason than that it fails to note the very real distinction between public commerce and private conversation.

The ACLU fears that blocking programs and rating schemes will make finding what it calls "controversial" material difficult. So what? Yes, you may have to work a wee bit harder to find that material, but no harder than you would now to find it in other media. And in fact, getting that material on the Web will increasingly become easier than driving crosstown to find it.

If that makes the Web a blander medium than it would be otherwise—a primary fear of the ACLU—so be it. At least then it will be a safe medium to have in our homes.

We've contributed several advances to the notebook PC.

Like inventing it.

NEC also introduced the first color laptop. The first notebook with an active matrix display and modular components. And one of the first portables with MMX™ technology. What's more, we offer the most extensive selection of notebooks available.

Our approach to direct sales is no less innovative. NEC NOW™ connects you with System Consultants who have the expertise to match the right notebook to your unique situation. And NEC NOW is backed by the resources, quality and dependability of one of the world's largest computer companies. We even give you the choice of working through a qualified NEC reseller partner.

Why NEC NOW?

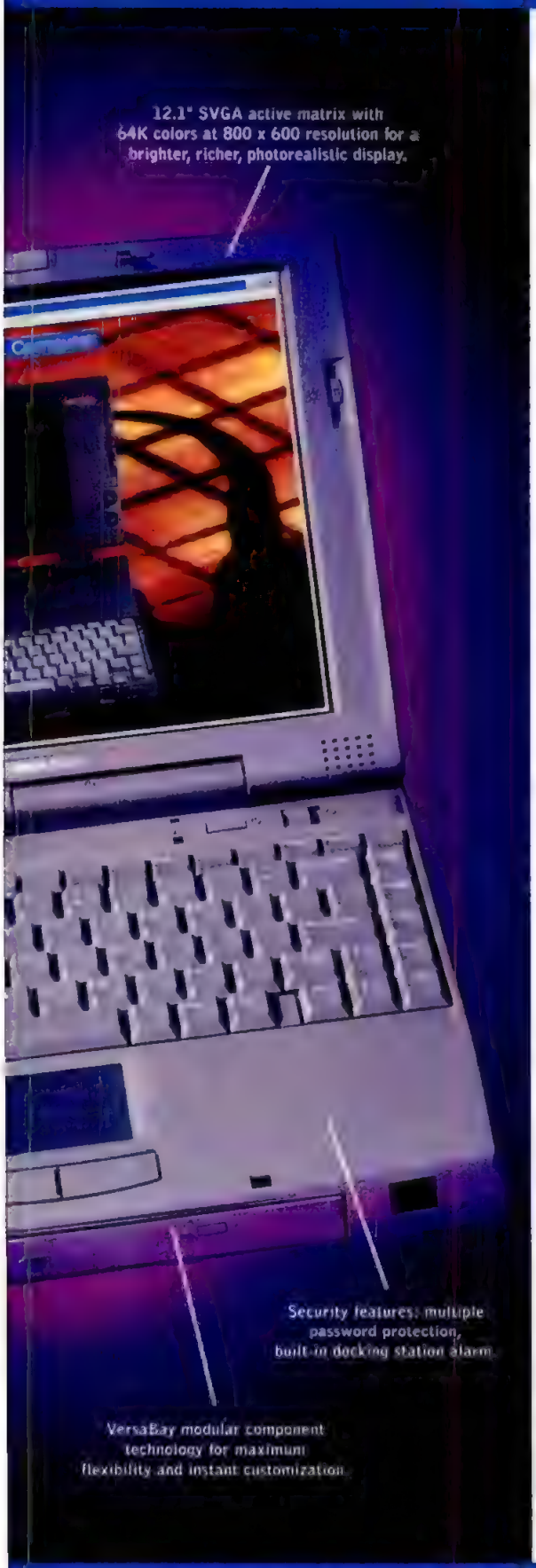
- The security of partnering with a company known for its technological innovations.
- The flexibility of ordering direct or through a reseller.
- The expertise of System Consultants.
- The immediate availability of competitively priced products.
- The resources of one of the world's largest computer companies.

NEC NOW

So when you need a notebook PC, call the company that invented it. And reinvented direct sales.

MMX™ intel inside pentium®

©1997 NEC Computer Systems Division. Packard Bell-NEC, Inc. NEC, Versa and MultiSync are registered trademarks, VersaBay, A700, C700, C500, ESM, PortBar, Mini-Dock and Express5800 are trademarks, and UltraCare is a service mark of NEC Corporation, all used under license by Packard Bell-NEC, Inc. Direction, versaNote, VersaExec, and MagicEye are trademarks and NEC NOW is a service mark of Packard Bell-NEC, Inc. Leasing based on typical 36-month lease with purchase option. Other lease options may be available. Leasing arranged by third party leasing company to qualified customers. Prices do not include shipping or applicable sales tax, are valid in the US only and are subject to change without notice. Products and specifications are subject to change without notice. *Product is 56Kbps capable. However, due to FCC rules which restrict power output of the service providers' modems, current download speeds are limited to approximately 53Kbps. Actual speed may vary depending on line conditions. MS, IntelliMouse, Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. NetWare and Novell are registered trademarks of Novell, Inc. The Intel Inside logo, LANDesk and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. All other trademarks and registered trademarks are property of their respective owners.



NEC Versa® 6060 Series [illegible]

Common Features: PCI Bus with 128-bit Graphics Accelerator • 32-bit CardBus Support • 2MB VRAM • Integrated 16-bit Stereo Sound • USB Port • VersaBay™ II Option Slot Accepts CD-ROM, Floppy Drive (both included), Optional 2nd Hard Drive and 2nd Battery • Lithium Ion Battery • DMI 2.0 Compliant • Intel LANDesk® Manager 3.0 • Microsoft® Windows® 95 • Upgradeable 3-Year Limited Warranty

Versa 6060

- 166MHz Pentium® processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 32MB EDO DRAM (80MB max)
- 2.1GB Hard Drive/20X max CD-ROM
- U.S. Robotics® x2™ XJACK® 56Kbps® Fax Modem
- Optional 2nd Lithium Ion Battery, add $199
- Optional Versa Docking Station 6000 plus, add $899
- Optional VersaExec™ Leather Carrying Case, add $199
- Upgrade to MS® Windows NT® 4.0, add $99

$3849
Business Lease: $135/mo.

Versa 6060

- 166MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB EDO DRAM (80MB max)
- 2.1GB Hard Drive/20X max CD-ROM
- Optional U.S. Robotics x2 XJACK 56Kbps® Fax Modem, add $199
- Optional 2nd Lithium Ion Battery, add $199
- Optional VersaPro Ballistic Nylon Carrying Case, add $99
- Optional Versa MiniDock™ 6000, add $499

$3499
Business Lease: $126/mo.

NEC Versa 2700 Series [illegible]

Common Features: PCI Bus with 128-bit Graphics Accelerator • 256KB L2 Pipeline Burst Cache • 32-bit CardBus Support • 2MB VRAM • USB Port • 56Kbps* Integrated Modem • Stereo Speakers and Subwoofer with 3D Stereo Sound • DMI 2.0 Compliant • Intel LANDesk Manager 3.0 • MS® Windows 95 • Bundled Microsoft Software Including MS Word 97 • Upgradeable 1-Year Limited Warranty

Versa 2760MT

- 166MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB EDO DRAM (96MB max)
- Built-in 2.1GB Hard Drive, 16X max CD-ROM, 1.44MB Floppy Drive, and Lithium Ion Battery
- Upgrade to 48MB RAM, add $299
- Optional Lithium Ion Battery, add $199
- Optional Versa PortBar™ 2700 Port Replicator, add $159
- Optional NEC Xircom 10Base-T Network Card, add $139

$3199
Business Lease: $115/mo.

Versa 2730M

- 133MHz Pentium processor with MMX technology
- 12.1" SVGA DSTN Color Display
- 16MB EDO DRAM (96MB max)
- Built-in 1.44GB Hard Drive, 16X max CD-ROM, 1.44MB Floppy Drive, and NiMH Battery
- Upgrade to 32MB RAM, add $159
- Optional Lithium Ion Battery, add $199
- Optional VersaNote™ Ballistic Nylon Carrying Case, add $69
- Upgrade to a 2.1GB Hard Drive, add $149

$2349
Business Lease: $85/mo.

NEC Versa 6200 Series [illegible]

Common Features: 64-bit CPU and 32-bit PCI Bus Architecture • 32-bit CardBus Support • 2MB VRAM • 16-bit Stereo Sound with 3D Spatializer Technology • VersaBay II Option Slot Accepts CD-ROM, Floppy Drive (both included), Optional 2nd Hard Drive and 2nd Battery • MS Windows 95 • Lithium Ion Battery • Upgradeable 3-Year Limited Warranty

Versa 6200MX

- 13.3" XGA Active Matrix TFT Color Display
- 166MHz Pentium processor with MMX technology
- 64MB EDO DRAM (128MB max)
- 3GB Hard Drive/10X avg CD-ROM
- Optional 2nd L thium Ion Battery, add $199
- Optional U.S. Robotics x2 XJACK 56Kbps® Fax Modem, add $199
- Optional VersaExec™ Leather Carrying Case, add $199
- Optional Versa Docking Station 6000 Plus, add $899

$4599
Business Lease: $161/mo.

Versa 6200MX

- 13.3" XGA Active Matrix TFT Color Display
- 166MHz Pentium processor with MMX technology
- 32MB EDO DRAM (128MB max)
- 2.1GB Hard Drive/10X avg CD-ROM
- Upgrade to 64MB RAM, add $299
- Optional NEC Xircom 10Base-T Network Card, add $139
- Optional VersaPro Ballistic Nylon Carrying Case, add $99
- Optional Versa MiniDock 6000, add $499

$3999
Business Lease: $140/mo.

To order, get a free catalog or find your nearest reseller call:
Mon-Fri 8am-8pm EST

1-888-8-NEC-NOW

Dept. No. PM577A www.necnow.com

NEC

NEC Direction™ PCs

Common Features: Mini-Tower or Desktop Tool-Less Chassis • 24X max CD-ROM • 3.5" Floppy Drive • MS Windows® 95 • MS Office 97 SBE • 2 USB Ports • Microphone • Palmrest Keyboard and MS IntelliMouse® • 3-Year Limited Warranty with 1-Year On-Site Service • *DirecPC Satellite Dishes are Now Available as Upgrades on all Direction Systems*

Direction SPL300

- 300MHz Pentium® II processor with MMX™ technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 6.4GB Ultra DMA Hard Drive, 9.5ms/64MB SDRAM
- Number Nine AGP Revolution, 8MB WRAM
- Altec® ACS-45 Speakers/Wavetable Audio
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- Iomega® Zip Drive
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to Altec ACS-410 Speakers with ACS-251 Subwoofer, add $69
- * Upgrade to NEC MultiSync® A700™ 17" Monitor (15.6" v.i.s.), add $229

$3499
Business Lease: $126/mo.

Direction SPL233

- 233MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C550 15" Monitor (14" v.i.s.)
- * Upgrade to 7.0GB Hard Drive, add $109
- * Upgrade to Number Nine AGP Revolution 3D, 4MB WRAM, add $219

$2199
Business Lease: $79/mo.

Direction SPL300

- 300MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 7.0GB Ultra DMA Hard Drive/64MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Wavetable Audio
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to Number Nine AGP Revolution 3D, 4MB WRAM, add $219
- * Upgrade to Iomega Zip Drive, add $99

$2949
Business Lease: $106/mo

Direction SPL266

- 266MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- NEC C550 15" Monitor (14" v.i.s.)
- * Upgrade to Wavetable Audio, add $49
- * Upgrade to NEC C700 17" Monitor (16" v.i.s.), add $199

$2329
Business Lease: $84/mo

NEC Express5800™ Series Servers ... your business.

Common Features: Integrated PCI Wide Ultra SCSI Disk Controller • Integrated PCI SCSI Controller for Media Bays • Integrated SVGA Controller • 1MB VRAM (upgradeable to 2MB) • 12X CD-ROM • 3.5" Floppy Drive • Mouse and Keyboard • NEC ESM™ Pro Server Management Software • MS Windows NT Server 4.0 and NetWare® 4.11 Certified • 3-Year On-Site Service Warranty

Express5800 LE2200

- Dual Capable Pentium II System w/one 266MHz Pentium II processor/512KB Integrated L2 Cache
- 64MB ECC DIMM Memory (512MB Maximum)
- One 4.3GB Ultra Wide SCSI Disk
- 8 Expansion Slots, 4 PCI, 3 ISA, 1 Shared
- 7 Drive Bays, 3 External 5.25", 4 Internal 3.5"
- Optional Second 266MHz/512KB Pentium II processor, add $1099
- Additional 64MB of ECC Memory, add $449
- * Optional PCI Ultra Wide SCSI RAID Controller, add $1349
- * 2/4/9GB Ultra Wide SCSI Disk Drives for up to 36GB of Storage Space, add $529/$849/$1299
- * Optional MS Windows NT Server 4.0, add $799

$3959
Business Lease: $139/mo.

Express5800 LE2000

- Dual Capable Pentium Pro System w/one 200MHz Pentium Pro processor/256KB Integrated L2 Cache
- 32MB ECC DIMM Memory (1GB Maximum)
- One 2.1GB Ultra Wide SCSI Disk
- 8 Expansion Slots, 4 PCI, 3 ISA, 1 Shared
- 7 Drive Bays, 3 External 5.25", 4 Internal 3.5"
- Optional Second 200MHz/256KB Pentium Pro processor, add $799
- Additional 32MB of ECC Memory, add $189
- * Optional PCI Ultra Wide SCSI RAID Controller, add $1349
- * 2/4/9GB Ultra Wide SCSI Disk Drives for up to 36GB of Storage Space, add $529/$849/$1299
- * Optional MS Windows NT Server 4.0, add $799

$2699
Business Lease: $97/mo.

MMX™ intel inside pentium

To order, get a free catalog or find your nearest reseller call Mon-Fri 8am-9pm EST

1-888-8-NEC-NOW

Dept.No. PM577A www.necnow.com

NEC

CIRCLE 113 ON READER SERVICE CARD

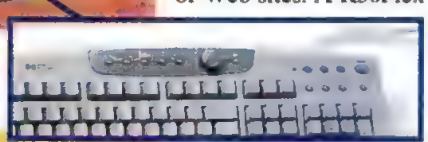
DESKTOP PCS

Home Is Where the PC Is

With school back in session and the holiday season approaching, many of the industry's leading PC vendors are equipping their machines with the latest in multimedia technology. NEC and Hewlett-Packard—both in the second tier of home PC sellers, behind such companies as Packard Bell, Compaq, and IBM—are reaching for more market share with brand new MMX Pentium and Pentium II machines targeted at the home market.

NEC (888-306-4636, *www.nec-computers.com*), which merged with Packard Bell last year, obviously has no intention of leaving the home market to its sister company. Imitating the split-system design of the IBM Aptiva S Series, NEC has introduced its DuoFlex chassis with the latest Ready PCs. The DuoFlex is a mini-tower with a detachable shoe-box-size MCU (Media Control Unit) that integrates a floppy disk drive, an LCD panel, and either a CD-ROM or a second-generation DVD-ROM drive. This way, you have the flexibility of placing the MCU conveniently beside the system monitor while keeping the rest of the mini-tower on the floor and out of sight. When used with the optional $49 NEC Internet Antenna and the AirMedia Live Internet Broadcast Network, the LCD displays news, sports scores, and stock prices. All Ready systems come equipped with a U.S. Robotics x2-compatible 56.6-Kbps DSVD modem.

At the low end of the 9750 series is the **Ready 9753** ($2,000 street), which includes a 233-MHz MMX Pentium processor, 32MB of RAM, a 4.3GB hard disk, a 24X CD-ROM drive, 16-bit 3-D SRS wavetable sound, and an ATI Rage II+ graphics board with 2MB SGRAM. The midrange **Ready 9759** ($2,400 street) has the same specs but substitutes a DVD-ROM drive for the CD-ROM drive.



A TALE OF TWO PCs: *The HP 8100 series with its customized keyboard (above, inset); NEC's DuoFlex design (below).*

The Ready 9760 series starts with the **Ready 9763** ($2,500 street), a 233-MHz Pentium II machine with 32MB of RAM, a 7GB hard disk, a 24X CD-ROM drive, 16-bit 3-D SRS wavetable sound, Trident graphics with 4MB of video DRAM, and the NEC Internet Antenna.

The 15-inch NEC CS500 Multimedia monitor, which is sold separately for $400 (street price) and matches the charcoal-gray DuoFlex chassis, integrates a 13.7-inch viewable area, two stereo speakers, and a microphone.

The ample software bundle includes Microsoft Word 97, Microsoft Money 97, Microsoft Encarta 97, Microsoft Publisher 97, Bookshelf 97, McAfee VirusScan and WebScan, and several MMX edutainmant packages. NEC's warranty provides a year of parts, labor, and on-site service.

The second generation of HP Pavilion PCs from Hewlett-Packard (800-724-6631, *www.hp.com*) are clearly identified by their sleek new look and three-toned chassis, which was developed by Lunar Design.

The 8100 Pavilion systems also ship with matching multimedia keyboards that offer built-in volume and CD-ROM controls, a headphone jack, and shortcut keys for launching particular applications or Web sites. A K56Flex 56.6-Kbps DSVD modem and a pair of Polk Audio stereo speakers that connect to a 16-bit 3-D sound card are standard; a Polk Audio subwoofer is an option that comes with the 300-MHz version. Targeting first-time users, HP makes getting onto the Web as easy as pressing a button on the aforementioned keyboard or clicking on a desktop icon; no setup procedure or credit card information is needed until the included 50 free hours have expired.

The 8100 line starts with the $1,900 (street) **HP Pavilion 8140** 200-MHz MMX Pentium machine, which features 32MB of EDO RAM, a 4.3GB hard disk, 256K of primary cache, a 24X CD-ROM drive, and an ATI mach64 graphics card with 2MB of VRAM.

Stepping to the head of the class is the $3,000 (street price) **HP Pavilion 8180.** This 266-MHz Pentium II system is outfitted with 48MB of EDO RAM, a 6GB hard disk, a 24X CD-ROM drive, an ATI 3D Rage II+ graphics card with 2MB of video RAM, a K56Flex 56.6-Kbps DSVD modem with answering machine and speaker phone, the HP Internet Antenna, and a wireless mouse. DVD-ROM drives are availabe on higher-end models.

Hewlett-Packard's optional, wireless Internet Antenna also receives news updates, sports scores, and stock quotes from the AirMedia Live Internet Broadcast Network; the Antenna comes standard with the 266-MHz Pentium II system. Also optional is the $250 HP Pavilion Personal Color Scanner, which connects to the Pavilion via a single USB cable and can be docked with the keyboard.

All of the 8100 models are videophone-enabled with Intel ProShare technology and come bundled with Microsoft Works, Quicken SE, a selection of imaging and edutainment software titles, and Compton's Interactive Encyclopedia.

For those on a tight budget, Hewlett-Packard is also offering a $999 home machine: the **HP Pavilion 3100.** This 200-MHz Pentium Classic machine is outfitted with 16MB of SDRAM, a 2.1GB hard disk, a 15X CD-ROM, a 33.6-Kbps modem, S3 Trio 64C+ graphics with 1MB of VRAM, 16-bit 3-D stereo sound, and stereo speakers. All monitors are optional, with a 17-inch model selling for $700 (street), a 15-inch model selling for $400 (street), and a 14-inch model selling for $300 (street). Hewlett-Packard's warranty provides a year of parts, labor, and onsite service.

Both NEC and Hewlett-Packard still sell through resellers and retailers, but NEC has plans to offer direct-channel machines in the near future. —*Cade Metz*

PERSONAL FINANCE

Capitalizing on the Web

Finally, personal finance software is banking on the Internet—literally and figuratively. Microsoft Corp. and Intuit are making it easier than ever before to manage your money electronically.

Microsoft Money 98 Financial Suite (800-426-9400, *www.microsoft.com*) has gone through a complete overhaul. Money 98 ($54.95), which runs on Windows 95 or NT 4.0, now has six main features: the Financial Home Page, a Goal Planner, Microsoft Investor, Microsoft Money Insider, Advisor FYI, and Monthly Report.

KEEPING IT EASY: *The Financial Home Page of Money 98.*

The Financial Home Page serves as your home base. Current financial information from external Web sources of your choice appears in columns on both sides of the interface. Money 98 helps you travel from your personal finance world to the World Wide Web, as long as you're using Microsoft Internet Explorer 3.0 or later or Netscape Navigator 3.0 or later. The Smart Internet Connect feature lets you conduct Internet-based online banking and bill payment; over 150 financial institutions are offering this, including American Express, Chase Bank, First of America Bank, and Wells Fargo.

The investments section of Money 98 links to Microsoft Investor, located at *investor.msn.com*; from there, you can track and trade stocks and mutual funds as well as research new investment possibilities. A free six-month subscription to the premium Investor service is included with Money 98.

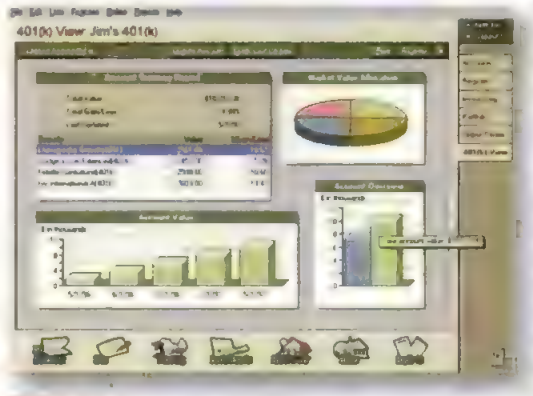
With Money 98's Goal Planner, you can determine and track your short- and long-term financial goals. Similarly, the Debt Reduction Planner will help you reach your goals more easily. The Microsoft Money Insider gives you up-to-date articles, worksheets, and other relevant information on various financial matters. Every time you go online, you'll receive the latest updates.

Another convenience is the Monthly Report. This feature lets you receive an all-encompassing, automatically generated monthly report that includes a spending and budget summary; net worth and debt-reduction progress; a list of the month's Advisor FYI alerts; information on the status of your investments; and an income-tax update.

New from Intuit (800-446-8848, *www.quicken.com*) is the latest upgrade to its popular Quicken Deluxe series. First and foremost, **Quicken Deluxe 98 for Windows** ($60 street) offers vastly improved Internet integration through Intuit's Web-based resources and a new interface that keeps an access toolbar at the bottom of the screen at all times. Now you can have timely financial news and information delivered to your desktop, covering such issues as buying insurance, filing taxes, and choosing a mortgage. By linking directly to Intuit's InsureMarket, you can find the best life-, car-, or house-insurance rates. Likewise, Quicken Mortgage offers links to numerous mortgage lenders and provides an automated application interview to help you find the mortgage best suited to you.

If your bank is partnered with Intuit, you can go online through Quicken and automatically retrieve your checking, credit card, and investment account data; participating banks include American Express, Bank Atlantic, Chase Manhattan Bank, and BankBoston. This functionality is bolstered by such new features as the Emergency Records Organizer, for maintaining critical information in a safe place in case of a financial emergency; the 401(k) Tracker, which follows the value and performance of your retirement account; and the Paycheck Wizard, which automatically tracks recurring payroll information, such as income, taxes, and 401(k) contributions.

Another highlight of Quicken Deluxe 98 is the new Market Watch, which transmits free, unlimited stock and mutual-fund price quotes directly into the Quicken framework. Intuit has also enhanced Quicken's Portfolio View to provide greater analysis for your stocks' and mutual funds' performances.



VISUAL AID: *Quicken's 401(k) Tracker provides a graphical means of viewing your retirement account.*

If you don't need the full range of functionality offered by Quicken 98 Deluxe, Intuit offers several tailored versions of Quicken 98. **Quicken Basic 98** ($40 street) lets you ease into managing such day-to-day chores as paying bills, balancing checkbooks, and transferring funds. Quicken Deluxe goes a few steps further by providing tools to help you organize, save, and invest your money.

Quicken Home & Business ($90 street) lets you manage both professional and personal finances. Addressing small-business needs, this Quicken incarnation adds invoicing, receivable tracking, and Schedule C reports. Finally, **Quicken Suite 98** ($90 street) consists of Quicken Deluxe 98, Quicken Financial Planner for personalized retirement preparation, and Quicken Family Lawyer Deluxe.

Intuit also offers the online service **BankNOW**, which you can download from Intuit's Quicken Web site (*www.quicken.com*). Used with Netscape Navigator or Microsoft Internet Explorer, this service is supported by nine banks: the Bank of Stockton, Barnett Bank, Centura Bank, Compass Bank, First Michigan Bank, First Union National Bank, Mellon Bank, PNC Bank, and Sanwa Bank California.

BankNOW lets you check your account balances, pay bills, and transfer funds between accounts without forcing you to load Quicken onto your system. Security measures abound with BankNOW: A PIN number authenticates every transaction, a 1,024-bit master RSA key encryption conducts session key exchange, and 128-bit triple DES encryption takes care of data encryption.

—Yvonne Koulouthros

RECAP *PC Magazine* reviewed four personal finance packages in the January 21, 1997, issue. Quicken Deluxe for Windows 6.0 received our Editors' Choice award.

Juiced Up.
Call now to order.
800-707-2329
www.micronpc.com
MICRON
ELECTRONICS
CONFIGURED FOR YOUR LIFE

Pick Micron.

We've got the best computers in the bunch.

At Micron, we know you want the freshest technology out there. So our engineers are continually devising new ways to make our award-winning PCs smarter, faster and more fun. Whether you use your computer for home or business, we've got a system for you. And you'll never find a lemon in the bunch. Our components go through rigorous quality-assurance testing, and all Micron™ products conform to the highest industry certification standards.

When you pick Micron, you can custom configure a system that fits your specifications – so it's homegrown, not mass-produced. Pick Micron and you'll get the steadfast 24-hour customer support that we're famous for. And when you pick Micron, you're getting one of the best limited warranties in the business from one of the best companies in the industry.

So pick Micron today. It'll be good for you.

Lots of zing.

The Micron TransPort™ Series. Notebooks with real bite.

What's small, sweet and gives you a lot of punch?

A Micron TransPort notebook, of course. Our outstanding line of portable PCs offers impressive flexibility, tempting prices and the hottest features on the market.

High-end users will love our TransPort XKE. A true desktop replacement, we've loaded our XKE with a high-performance graphics accelerator, active matrix screen, upgraded CD-ROM, tons of memory and more. Our TransPort XPE fits the bill if you're looking for a top-grade computer for home, office or travel. And our TransPort VLX offers flexibility and sleek styling for a more-than-palatable price.

So pack a little punch. Try our TransPort notebooks.

MMX intel inside pentium

Call now to order.
800-707-2329
www.micronpc.com

MICRON ELECTRONICS

CONFIGURED FOR YOUR LIFE

Like peas in a

The Micron Vetix™ and ClientPro® Series. Solutions for a healthy network.

Need solutions for your growing network?

If you can dish it out, our systems can take it. Our ClientPro PCs and Vetix servers effortlessly get your network running – and keep it running.

We pack our hardy Vetix MXI chock-full of features, like redundant power supplies and high-degree, fault-tolerant components including swappable hard drives. And we made our entry-level LXI models expandable, reliable and tough.

Complement your server with our ClientPro desktops. We've designed them to be easy to set up, easy to upgrade and easy to network. That means you reduce potential downtime and lower your total cost of ownership. And if you have networking questions – your answers are just a phone call away. That's what our unwavering customer support is all about.

This powerful pair makes networking easy. And that's a pretty sweet dish.

pod.

The Micron Powerdigm™ sets a sizzling pace.

The Powerdigm XSU revolutionizes the workstation with Micron's engineered and developed Samurai™ chipset. A powerful, Intel-processor based workstation, the Powerdigm XSU executes demanding business and technical tests with command, and it's flexible enough to run popular PC programs.

Micron is the only company to offer the innovative Samurai chipset. With support for dual monitors, dual Pentium® II processors, ultra-wide SCSI-3 and speedy 10/100 network adapters, the Powerdigm sizzles with features the competition is still dreaming about. You'll see the results in graphic design, digital imaging, financial analysis, CAD and more. The Powerdigm XSU, featuring the new Samurai chipset, takes workstation performance to new levels with 66MHz/64-bit PCI, enhanced memory and I/O subsystems.

intel inside
PENTIUM® PRO PROCESSOR

Call now to order.
800-707-2329
www.micronpc.com

MICRON ELECTRONICS

CONFIGURED FOR YOUR LIFE

Extra hot.

The Micron Millennia® Series adds kick.

Our powerful new Millennia XKU packs a Pentium® II processor featuring MMX™ technology, while the Millennia MME has a Pentium processor with MMX technology. Both offer 3D video, MPEG, and 24X EIDE CD-ROM and more - so you can dish up the most intense games and Internet sites.

If you want even more sizzle to your gaming experience, add our Fusion3D option, which includes DVD software, Monster 3D graphics card, AWE 64 PCI sound card and a two speaker satellite with a subwoofer stereo system, plus five intense multimedia computer games.

Now when you buy a Millennia, you can choose one of four feature-packed software bundles to be preinstalled in your system - at no extra cost!

Quicken Financial helps you organize personal finances — from money management to estate planning. Young children learn lots from computer games with the **EdVenture Pack**. Fun titles, fun songs, fun games ... and lots of learning Get your fill of intense multimedia and entertainment applications with the **Multimedia Xcitement** package - call for current titles and details. And the **Home Productivity Pak** offers games and reference tools for the entire family.

One of these four packages is standard with your new Millennia. Additional bundles are only $69 each, as is the upgrade to our Academic Bundle, which includes useful references and information for students.

Or, upgrade to our Small Business Essentials package for only $249. This must-have bundle for small businesses includes titles you can use every day.

Hot enough for you?

MMX™ intel inside pentium®

MICRON™ MILLENNIA® Xku

Intel 300MHz Pentium® II processor (features MMX™ technology)
128MB SDRAM
8.1GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16.0" display)

STANDARD FEATURES

82440LX chipset
512KB internal L2 cache, 2MB BIOS
100MB Iomega Zip drive, 3.5" floppy drive
24X EIDE variable speed CD-ROM drive
32 voice wavetable stereo sound, powered speakers with subwoofer
USR Sportster 56K x2 data/fax modem**
AGP 128-bit 3D video with 4MB SGRAM
Microsoft® Intellimouse™, USB connections
Microsoft Windows® 95 and MS® Plus!
Microsoft Office 97 Small Business Edition
Choice of Micron Software Solutions Pak
5-year/3-year Micron Power™ limited warranty

$3,999
Bus. lease $140/mo.

MICRON MILLENNIA Mxe 200

Intel 200MHz Pentium processor with MMX technology
48MB SDRAM
4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16.0" display)

STANDARD FEATURES

512KB pipeline burst cache, flash BIOS
3.5" floppy drive
100MB Iomega Zip drive
24X EIDE variable speed CD-ROM drive
32 voice wavetable stereo sound with speakers
USR Sportster 56K x2 data/fax modem**
PCI 64-bit 3D video, MPEG, 4MB EDO DRAM
Microsoft Intellimouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
Choice of Micron Software Solutions Pak
5-year/3-year Micron Power limited warranty

$2,299
Bus. lease $78/mo.

MICRON MILLENNIA Lxe 166

Intel 166MHz Pentium processor with MMX
16MB EDO RAM
3.2GB EIDE hard drive
15" Micron 500FGx, .28dp (13.7" display)

STANDARD FEATURES

512KB pipeline burst cache, flash BIOS
3.5" floppy drive
16X EIDE variable speed CD-ROM drive
16-bit stereo sound and speakers
PCI 64-bit 3D video, MPEG, 4MB EDO RAM
Microsoft Mouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Works
Choice of Micron Software Solutions Pak
5-year/3-year Micron Power limited warranty

$1,499
Bus. lease $56/mo.

MICRON SOFTWARE SOLUTIONS PAKS†

Quicken Financial Pak: Quicken Deluxe 6, Family Lawyer, Parent's Guide to Money, Financial Planner
EdVenture Pak: Thinkin' Things #2, Sheila Rae The Brave, Reader Rabbit's Reading #1, Freddie Fish: Missing Kelp Seeds, Putt-Putt Saves the Zoo
Multimedia Xcitement Pak: (MMX enhanced titles, call for details)
Home Productivity Pak: Family Doctor, Comptons Encyclopedia 1997, Mavis Beacon Teaches Typing, Printshop Ensemble, Net Nanny, Crayola Magic 3D
Academic Bundle: Merriam Webster's Collegiate, Word Smart, Grolliers Encyclopedia, Student Reference Library, Quicken SE, Hoyle Classic Games

Choice of one Solutions Pak with purchase of Millennia system. Pick an additional bundle for only . . .

$69

MICRON FUSION3D OPTION PAK

DVD-ROM*, DVD software
E4 Cool DVD PCI docoder card: 6 channel AC-3 2 channel out capability, SPDIF output (digital audio out)
AWE 64 ISA sound card
Cambridge SoundWorks/MicroWorks
2 speaker satelite with subwoofer stereo system
Monster 3D graphics card with 4MB memory
Fusion3D game pak:
Mech Warrior 2; Mercenaries 3Dfx version, AH-64D Longbow,
U.S. Navy Fighters '97, Command & Conquer, Popular 3Dfx Racing Sim
Microsoft Sidewinder Pro joystick

Available on Millennia Mxe and Xku systems only.

Xku add $649
Mxe add $699

Call now to order.
800-707-2329
www.micronpc.com

MICRON ELECTRONICS

CONFIGURED FOR YOUR LIFE

*The CD-ROM drive will be removed upon the purchase of the DVD upgrade.
**Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and transfer rates may be less than the maximum potentials.
† Available only on Millennia systems with Microsoft Windows 95.

MICRON VETIX LXI-N SERVER

Intel 200MHz Pentium Pro processor
32MB ECC EDO RAM
2GB Ultra Wide SCSI-3 hard drive
15" Micron 15FGx, .28dp (13.7" display)

STANDARD FEATURES

Dual Pentium Pro ZIF sockets
256KB integrated L2 cache
Memory upgradable to 1GB (8 DIMM slots)
5 PCI, 2 ISA, 1 shared ISA/PCI, 9 drive bays
Integrated Adaptec PCI Ultra-Wide SCSI-3 controller
Integrated Intel EtherExpress™ Pro 100 controller
Integrated SVGA graphics
12X SCSI-2 CD-ROM drive
3.5" floppy drive
Dedicated server technical support, 7x24
5-year/3-year Micron Power limited warranty
1-year next-business-day on-site service†

$2,999
Bus. lease $102/mo.

MICRON VETIX MXI SERVER

Intel 200MHz Pentium Pro processor
128MB ECC EDO RAM
Three 4GB Ultra-Wide SCSI-3 hard drives (12GB total)

STANDARD FEATURES

256KB integrated L2 cache
Dual Pentium Pro ZIF sockets
Memory upgradable to 1GB (8 DIMM slots)
8 open expansion slots: 5 PCI, 2 ISA, 1 shared ISA/PCI
Integrated Adaptec PCI Ultra-Wide SCSI-3 controller
Integrated Intel EtherExpress Pro 100 controller
12X variable speed SCSI CD-ROM drive
5 internal, hot-swappable, hard drive array bays (upgradable to 10)
3 external 5.25" media bays
1 (one) 330 watt power supply standard (upgradable to 3 for added redundancy)
Microsoft Windows NT Server 4.0 (10-user license)
Intel LANDesk Server Manager 2.52
Dedicated server technical support, 7x24
5-year/3-year Micron Power limited warranty
1-year next-business-day on-site service†
NOS Support (3 incident resolutions/ 1st year), 7x24

$7,999
Bus. lease $251/mo.

† On-site service for the Vetix server is provided by Digital Equipment Corporation and is optional.

MICRON TRANSPORT XPE

150MHz Mobile Intel Pentium processor with MMX
32MB EDO RAM (80MB max)
1.4GB removable hard drive
12.1" active matrix color display, 800x600

STANDARD FEATURES

256KB L2 pipeline burst cache
PCI graphics accelerator, 2MB VRAM
8X modular CD-ROM drive
Pick-a-Point™ dual pointing devices
Micronphone and 16-bit stereo sound
Motorola Montana 33.6 fax/modem
CardBus- and zoomed video-ready
2 infrared ports, S-video, NTSC, game port
Management and Executive Travel software pak
2 modular expansion bays
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition CDs
5-yr/3-yr Micron Power limited warranty

$3,499
Bus. lease $119/mo.

MICRON TRANSPORT XKE

233MHz Mobile Intel Pentium processor with MMX
48MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display

STANDARD FEATURES

512KB L2 pipeline burst cache
128-bit 2MB DRAM graphics
20X modular CD-ROM drive with AutoPlay™ technology
Pick-a-Point dual pointing devices
Microphone and 16-bit stereo sound
Integrated 33.6 modem, full duplex
CardBus-and zoomed video-ready
2 infrared ports, S-video, NTSC, game/MIDI port, USB
Management and Executive Travel software pak
2 modular expansion bays
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition CDs
5-yr/3-yr Micron Power limited warranty

$5,899
Bus. lease $185/mo.

Folded edge of the page

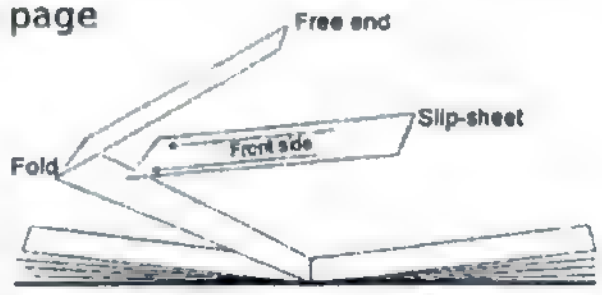
GbsSlipSheet-001

Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

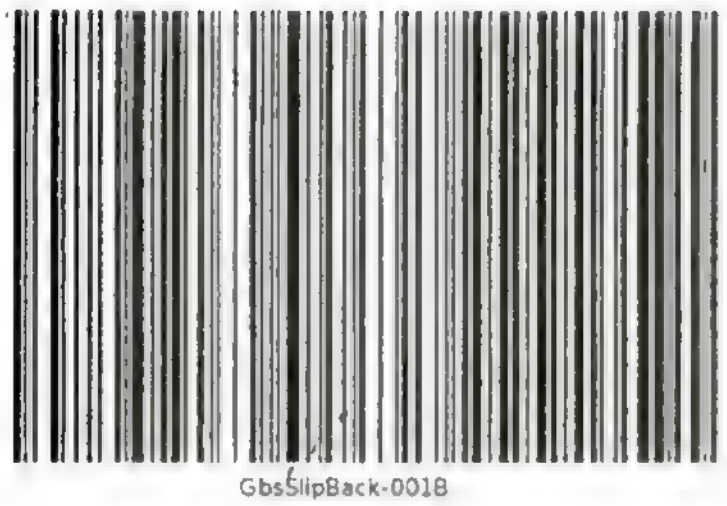
Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Back

1. Follow instructions on the other side



Back

1. Follow instructions on the other side

Sweet deals.

MICRON CLIENTPRO MTE

Intel 166MHz Pentium processor with MMX technology
32MB EDO RAM
2.1GB SMART EIDE hard drive
15" Micron 500FGx, .28dp (13.7" display)

STANDARD FEATURES

512KB pipeline burst cache, flash BIOS, DMI Support
3.5" floppy drive
3Com 3C905 network adapter
Integrated S3 ViRGE/DX graphics accelerator, 2MB EDO RAM
Integrated wavetable sound
Tool-free minitower or desktop
Microsoft Intellimouse
Microsoft Windows 95
Intel LANDesk® Client Manager
5-year/3-year Micron Power limited warranty

$1,549
Bus. lease $53/mo.

MICRON CLIENTPRO XLU

Intel 233MHz Pentium II processor with MMX technology
32MB EDO RAM
2.1 GB SMART EIDE hard drive
17" Micron 700FGx, .26dp (16.0" display)

STANDARD FEATURES

512KB internal L2 secondary cache, DMI support
3.5" floppy drive
16X EIDE variable speed CD-ROM drive
3Com PCI 10/100 ethernet NIC
PCI 64-bit 3D video, MPEG, 4MB EDO RAM
Upgradable wavetable audio with speakers
Microsoft Intellimouse
Microsoft Windows NT Workstation
Intel LANDesk Client Manager
5-year/3-year Micron Power limited warranty

$2,549
Bus. lease $87/mo.

MICRON POWERDIGM XSU

Dual Intel 300MHz Pentium Pro processors
64MB ECC SDRAM
Fire GL 1000 pro 8MB 66MHz PCI Open GL Professional 3D accelerators
4GB Ultra-Wide SCSI-3 hard drive
19" Hitachi SuperScan CM751 (18" display) .26dp color monitor

STANDARD FEATURES

12/20 variable speed SCSI CD-ROM drive
Memory upgradable to 1GB ECC SDRAM
Supports multiple Ultra-Wide SCSI-3 hard drives
DMI, software and hardware management support
Iomega Jaz SCSI drive with 1GB removable cartridge
Wavetable stereo sound with speakers
Fast Ethernet 10/100 PCI network adapter
Microsoft Intellimouse
Microsoft Windows NT® Workstation
5-year/3 year Micron Power limited warranty

$6,199
Bus. lease $195/mo.

MICRON TRANSPORT VLX

133MHz Intel Pentium processor
16MB EDO RAM (40MB max.)
1.4GB hard drive
16X modular CD-ROM drive
Li-Ion battery
12.1" TFT SVGA, 800x600 display

STANDARD FEATURES

256KB L2 pipeline burst cache
PCI bus with 128-bit graphics accelerator
MPEG compatible
Zoomed video-ready
Touchpad pointing device
Microphone and 16-bit stereo sound
2-way infrared port
Modular floppy drive
Microsoft Windows 95 and MS Plus!
5-year/1-year Micron limited warranty

$2,249
Bus. lease $77/mo.

Appealing options.

MULTIMEDIA OPTIONS

AWE 64 ISA Sound card upgrade	$99
Advent AV270 Powered Partners stereo speakers	$79
Advent AV370 Powered Partners stereo speakers with subwoofer	$199
Microsoft SideWinder 3D Pro joystick	$59
Microsoft SideWinder gamepad	$39

STORAGE/MEDIA OPTIONS

Adaptec 2940U Ultra SCSI Fast-20 controller (upgrade from system with standard Ultra SCSI Fast-20 controller)	$100
Plextor 12/20 Plex 3MB/sec SCSI internal CD-ROM drive (upgrade from system with standard EIDE CD-ROM drive)	$100[1]
Iomega Jaz SCSI drive with 1GB removable cartridge	$299[1]
Iomega ZIP IDE drive with 100MB removable cartridge	$99
Iomega 6-pack of 100MB Zip cartridges	$89
Iomega 3-pack of 100MB Zip cartridges	$49
Sony 4/8GB SCSI DDS-2 tape backup drive with tape and software	$899[1]
Cheyenne ARCserve with InocuLAN (for servers)	$499
Mylex dual channel Ultra-Wide SCSI-3 RAID caching controller with 4MB ECC RAM	$899

COMMUNICATION OPTIONS

33.6 external data/fax modem	$299
56Kbps technology modem**	$99

NETWORKING OPTIONS

3Com 3C509B Etherlink III ISA combo network adapter	$79
3Com 3C900 EtherLinkXL PCI combo network adapter	$99
3Com 3C905 Fast EtherLinkXL 10/100 PCI TPO network adapter	$99
3Com OfficeConnect Hub 8/TPC	$149
3Com OfficeConnect Switch 100	$969

SOFTWARE OPTIONS

Small Business Essentials: QuickBooks, Visio, Norton AntiVirus, Astound, Focal Point, American Yellow Pages	$249
CorelDRAW 7 (full retail version)	$299
Corel WebMaster Suite (full retail version)	$99
Novell Intranetware 4.11, 5-user license, (for Yeltx (Ls-n only)	$699

HP PRINTERS

HP DeskJet 692c printer	$319
HP DeskJet 870Cxi printer	$419
HP LaserJet 6Lxi printer	$429
HP LaserJet 6P printer	$799

DISPLAY/VIDEO OPTIONS

17" Hitachi SuperScan CM630 (15.9" display) .26dp color monitor	$100[2]
21" Hitachi SuperScan CM801 (20.0" display) .26dp color monitor	$650[2]
Number Nine Imagine 128 series II video card, 4MB VRAM	$299[3]
Number Nine Imagine 128 series II video card, 8MB VRAM	$549[3]

TRANSPORT OPTIONS

MicronDock™ multimedia port replicator: ethernet 10BT LAN adapter, SCSI-2 port, S-video and NTSC-video output, built-in stereo speakers, infrared port, headphone, microphone, line-in jacks, parallel, serial, VGA and 2 PS/2 ports (with warm dock and built-in game port - available on XPE models only)	$299
Micron Executive™ desktop package: matching black 17" monitor (16.0" display), mouse, mousepad and keyboard (can be used with or without MicronDock)	$699
Motorola Montana 33.6 fax/modem supports regular telephone connections, cellular phones and two-way paging devices	$259

SCANNER OPTIONS

HP Scanjet 5s sheetfed scanner	$209
HP Scanjet 5p flatbed scanner	$309
HP Scanjet 4c flatbed scanner	$759

DESKTOP EXTENDED SERVICE OPTIONS

Optional 1st year on-site service[1] coverage included	
2nd year on-site service[1] coverage	$79
2nd and 3rd year on-site service[1] coverage	$99

Other service options may be available, ask your system consultant

SERVER EXTENDED SERVICE OPTIONS

2nd and 3rd year next-business-day[4] on-site service coverage[1]	$99
4-Hour response[5] on-site service coverage[1] (8am-5pm, M-F), 3 years total	$798
4-Hour response[5] on-site service coverage[1] (24-hours, 7 days per week), 3 years total	$998

Other service options may be available, ask your system consultant

NOTEBOOK EXTENDED SERVICE OPTIONS (Yes only)

2nd and 3rd year parts and labor[6]; 3-business-day turnaround for 3 years	$269
2nd and 3rd year parts and labor[6]; 7-business-day turnaround for 3 years	$209

OTHER OPTIONS

APC Pur7T surge suppressor	$39
APC Pro7T surge suppressor	$59
APC Smart-UPS 700 with PowerChute plus software	$389
APC Smart-UPS 1000 with PowerChute plus software	$529
Microsoft Natural Keyboard (upgrade from standard keyboard)	$49

[1] Requires SCSI host adapter
[2] Upgrade from system with standard Micron 17" 700Fst (15" display) color monitor
[3] Upgrade from systems with standard 64-bit 4MB video card
[4] 1st year on-site service is available in the United States and is limited areas in Canada from third-party service provider per customer's agreement with provider
[5] 2nd year and 2nd and 3rd year offerings are available in the United States only. Extended warranty, if purchase after system shipment may have a higher cost.
[6] Services will be scheduled, whenever possible, for the next business day after parts are received by the customer
Available in certain locations; see your system consultant for details
Some options not harmonious; available with system purchase only

*Available only on desktop and notebook systems with Microsoft Windows 95.
**Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

MICRON POWER WARRANTY

- 5-year limited warranty on microprocessor and main memory
- 3-year limited parts-only system warranty (1 year for TransPort XLe)
- 1-, 2- or 3-year options on-site service agreement for Micron desktop and server systems
- 30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
- 30-day money back policy
- 24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.

Call now to order.

800-707-2329

www.micronpc.com

Micron Sales Hrs: Mon-Fri, 6 am-10 pm, Sat, 7 am-5 pm (MT) Technical Support Available 24 Hours A Day, 7 Days A Week
Toll free from Mexico: 95-800-708-1755
Toll free from Canada: 800-708-1758 • Toll free from Puerto Rico: 800-708-1756 • International Sales: 208-893-8970 • International Fax: 208-893-7393

MICRON ELECTRONICS

©1997 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice. prices do not include shipping and handling and any applicable taxes. 30-day money-back policy does not include return freight and original shipping handling charges, applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics current terms and conditions of sale. Lease prices based on 36-month lease. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

CONFIGURED FOR YOUR LIFE

POINTING DEVICES

Playing Cat—and Mouse

If you think there's nothing in life that can't stand a little improving, take a look at these new entries in the field of pointing devices.

Logitech (800-231-7717, *www.logitech.com*) has revamped its entire line of pointing devices. The **FirstMouse+** ($30 street) has a comfortable, ambidextrous design and features a dual-function wheel button that gives it the same features as the Microsoft IntelliMouse—only at a lower price.

The long-awaited update to Logitech's **MouseMan** ($60 street) design is contoured to fit the human hand for better support and comfort. It has three fully programmable buttons, a unique thumb button, and the textured wheel button of the FirstMouse+.

Want something different than a wheel? Long-time mouse vendor KYE International Corp. (800-456-7593, *www.genius-kye.com*) has the unique **Genius NetMouse Pro** ($20 street). This ambidextrous device has a convenient rocker button in between the two mouse buttons and a side button that's mounted on the left-hand side of the mouse. The NetMouse Pro enables you to have scroll, pan, and zoom functionality in Microsoft Windows 95 and 3.1 and supports Microsoft's IntelliMouse.

If trackballs are more your speed, then try out the new **Microsoft IntelliMouse TrackBall** ($85 street), from Microsoft Corp. (800-456-7593, *www.microsoft.com*). The IntelliMouse TrackBall is especially comfortable for those with small- to medium-size hands. An IntelliMouse-style wheel located to the right of the trackball allows you to scroll and zoom through IntelliMouse-enabled applications; the two mouse buttons are stacked one above the other on the left side of the device.

Taking another approach to trackballs is the **evolution MouseTrak**, from ITAC Systems (800-533-4822, *www.mousetrak.com*). The Mouse-Trak's sleek design has a built-in elevated hand-rest to reduce operating fatigue. The six buttons fall naturally under the thumb and pinkie, and you can either use the preset button functions or program new functions yourself. Also, you can comfortably use it with either hand.

For a completely untethered mousing experience, Diamond Multimedia Systems (800-462-5846, *www.diamondmm.com*) offers the wireless $99.95 **GyroMouse**. Based upon technology licensed from Gyration, the GyroMouse can be used on or off the desk. Its radio frequency (RF) technology allows it to work from up to 30 feet away from your computer with a full 360 degrees of motion, making it ideal for multimedia presentations or Web surfing at home.

Cirque Corp. (888-454-3373, *www.glidepoint.com*) is chasing down traditional mice with the $89 **Power Cat**. The new touch pad includes integrated elements such as horizontal and vertical scrollbars and forward and backward Web-browser buttons. It also comes with a two-stage pen and software for adding signatures to documents. In addition to two mechanical buttons on the side that can perform eight programmable functions, the Power Cat has right and left tap zones on the pad's surface for quick clicking.

Also on the touch-pad front is the **VersaPad** ($70 street), from Interlink Electronics (800-340-1331, *www.interlinkelec.com*). The VersaPad comes with a writing stylus and a graphics capture utility that's accessible with a "Scribble" button; this handy feature makes it simple to add your signature to any document. You can drag items just by clicking and dragging the stylus across the pad's surface. The VersaPad also has integrated scroll bars, two mechanical mouse buttons, and five programmable tap buttons.—*Michael N. Rusignuolo*

CHOOSE YOUR OWN DEVICE: *Shown clockwise (from left to right) are new pointing devices from Interlink, KYE International, Logitech, ITAL Systems, Cirque, Microsoft, and Diamond.*

MONITORS

More Screens to Monitor

Are you ready for a larger worldview? This issue's roundup of 17- and 19-inch monitors—"Big Screens, Low Prices"—offers a number of options from which to choose. Not featured in that review are 19-inch monitors from Compaq Computer Corp. and Optiquest, both of whom were unable to send us products in time for testing.

The new **V90** from Compaq (800-345-1518; *www.compaq.com*) is the 19-inch sibling of the **V70** that's reviewed in the main roundup. Targeted at high-end graphic designers and CAD users, the monitor ($1,000 street) is based on an Invar shadow-mask tube. It also has a dot pitch of 0.26 mm and is capable of 1,280-by-1,024 resolution at a refresh rate of 85 Hz.

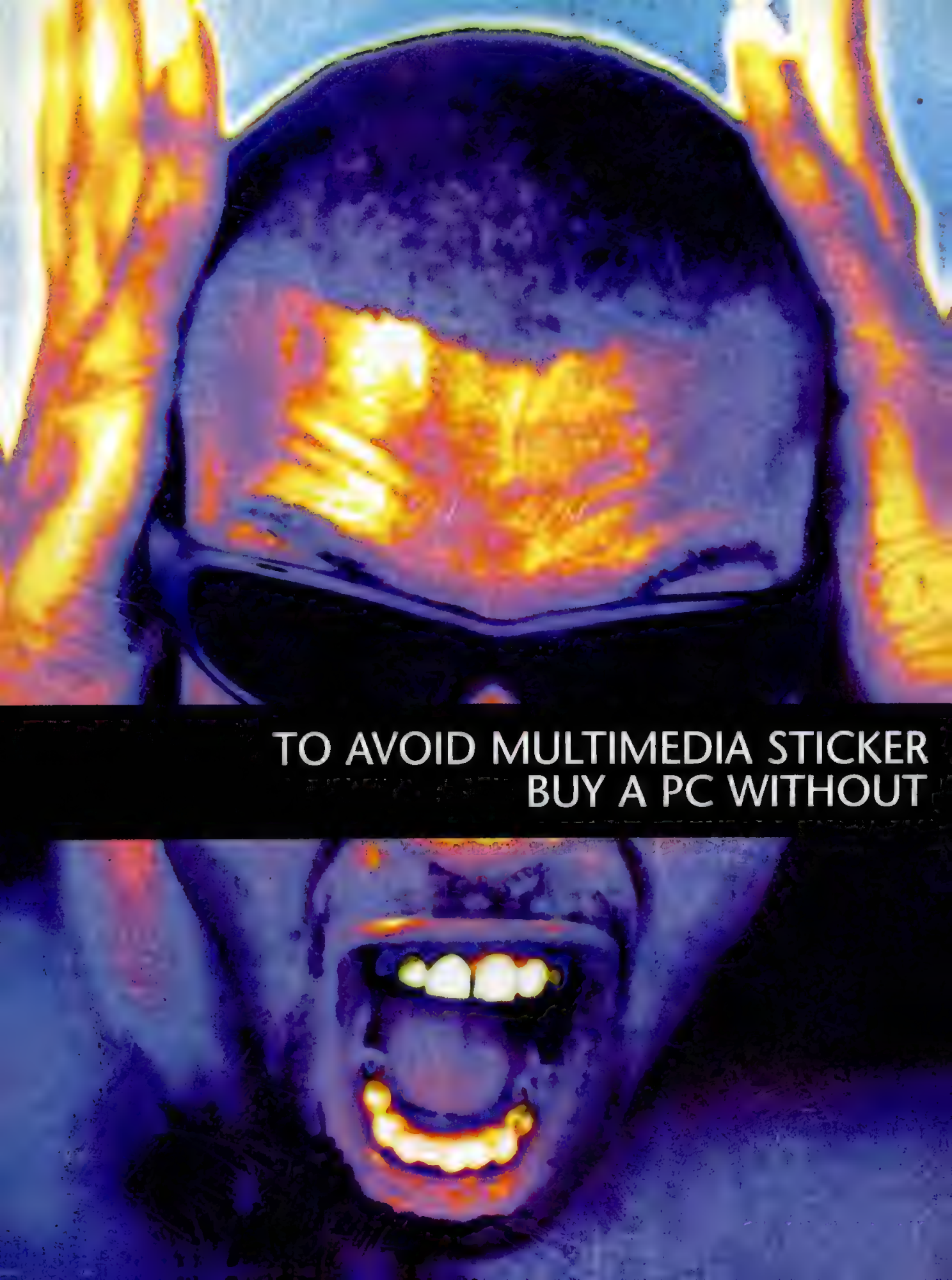
On-screen controls enable you to have a full range of important customization options, including screen tilt and moiré cancellation. The V90, which meets the TCO 95 cost-of-ownership specification, comes with a USB port, Sonnetech's Colorific, and a three-year warranty with a year of on-site service.

Optiquest (800-843-6784, *www.optiquest.com*) offers the 19-inch **V95** ($1,000 street), which is also based on a 0.26-mm Invar shadow-mask tube. Like the Compaq unit, it is targeted at budget-minded graphic designers; unfortunately, it is not yet TCO 95–compliant. Coated with an antistatic, antiglare treatment, the V95 is capable of having 1,280-by-1,024 resolution at an 88-Hz refresh rate. It also features its own on-screen digital controls.

BIGGER IS BETTER: *Optiquest's new 19-inch V95 monitor.*

An added boon is the Express Exchange service, available through Viewsonic, Optiquest's parent company (pricing is expected to be around $100). If your monitor is broken, the company will bring you a temporary one within a day or two while you await the repair of your unit.—*Josh Levy*

DIGITAL COLLAGE BY LORA MORGENSTERN


TO AVOID MULTIMEDIA STICKER
BUY A PC WITHOUT

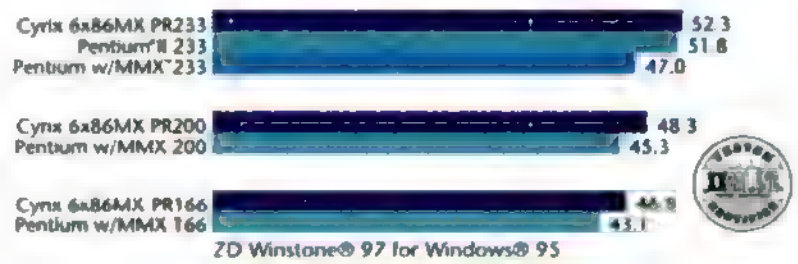
Shouldn't a multimedia PC blow you away with its great performance, rather than its price? Which is why you should do yourself a favor and take a look at an affordable, high-performance system powered by a Cyrix®6x86MX™ processor. Why? Because they consistently outperform those that use other processors in standard industry benchmark tests (see the Winstone performance comparison chart below).

And the best news of all? All Cyrix 6x86MX processors do it at a price that'll blow your socks off.

To find out more about Cyrix 6x86MX-powered multimedia PC systems and where you can buy them, visit **www.cyrix.com/shock** or call **1-800-215-6823, ext. 101.**

SHOCK: A MULTI-MEGABUCKS PRICE TAG.

Because there's nothing more shocking to your finances than finding out you paid more than you had to for your system.



© 1997 Cyrix Corporation. All rights reserved. Cyrix is a registered trademark and 6x86MX is a trademark of Cyrix Corporation. Pentium is a registered trademark and MMX is a trademark of Intel Corporation. All other brand or product names are trademarks or registered trademarks of their respective holders.

CIRCLE 343 ON READER SERVICE CARD

Cyrix 6x86MX PROCESSOR

Copyrighted material

ONLINE SHOPPING ASSISTANTS

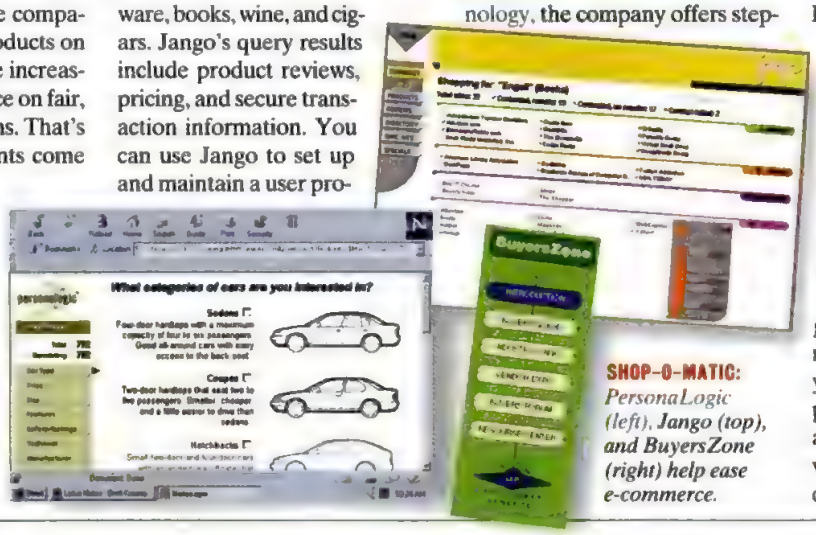
Don't Netshop Without It

The Internet can be a valuable resource for finding the best products at the best prices, and with the growth of e-commerce and the entry of more and more companies marketing their products on the Web, consumers are increasingly looking for guidance on fair, safe Internet transactions. That's where shopping assistants come into play.

Netbot (206-522-7800, *www.netbot.com*), the creator of metasearch engine MetaCrawler, has developed **Jango**, a free, downloadable utility that's available at *www.jango.com*. Jango uses MetaCrawler's parallel-pull technology to query a group of online retail sites chosen by Netbot. The sites cover a wide range of categories, encompassing such products as hardware, software, books, wine, and cigars. Jango's query results include product reviews, pricing, and secure transaction information. You can use Jango to set up and maintain a user profile with your address and credit card information so that your default information can be automatically filled in when you're ready to make a purchase.

PersonaLogic (619-220-5800, *www.personalogic.com*) takes a different spin on shopping. Utilizing proprietary **personalogic** technology, the company offers step-by-step decision guides that help you find the perfect product or service for your needs. PersonaLogic plans to license its technology to corporate Web sites that want to implement e-commerce catalogs with a personalized feel. (Softbank, the parent company of Ziff-Davis, is an investor in PersonaLogic.) Visit PersonaLogic's Web site and try out its own sample decision guides for cars, notebook PCs, and more.

If you're in charge of purchasing for a small or midsize business, you may want to get advice at **BuyersZone** (617-924-0044, *www.buyerszone.com*), a new service from Beacon Research Group. This site provides buyers' guides, insight on industry terminology, and bulletin boards where you can share your purchasing problems with peers. BuyersZone also puts you in touch with vendors via site-managed electronic reply cards.—*Brett Krasnove*



SHOP-O-MATIC: *PersonaLogic (left), Jango (top), and BuyersZone (right) help ease e-commerce.*

LANGUAGE TRANSLATION

It's a Small World After All

Even though English is perceived as the lingua franca of the computer industry, in this global age, lacking the ability to communicate with foreign peers and customers in their own languages can be bad for business.

The Internet is home to many language translation sites that offer everything from simple on-line dictionaries to e-mailed translation services. Unfortunately, the dictionaries are frequently incomplete and the services usually take at least 24 hours, which is inadequate for the internal communications of a multinational corporation.

To meet these needs, companies such as E Corp. (*www.e-corp.com*) are beginning to build translation capabilities into their products. E Corp.'s $59.97 **email 97** message management suite offers a licensed version of a translation utility from Globalink (*www.globalink.com*). From your desktop, you can translate both outgoing and incoming e-mails via any language pair made up of English, Italian, French, German, Spanish, and Portuguese.

NON PARLA ITALIANO? *E Corp.'s eTranslator utility, which works in tandem with email 97.*

Globalink has partnered with TenFour (703-716-8364, *www.tenfour.com*) to bring translation to TenFour's **TFS Gateway, Release 3**, an e-mail gateway that handles conversions between different e-mail platforms. An add-on tool, **TFS Translator**, works with the gateway to translate outgoing messages from English, Italian, French, German, Spanish, or Portuguese into any of these languages. This utility, due out before the end of the year, starts at $1,500 for five users. TFS Gateway is already able to import different character sets, such as Japanese.—*Regina Kwon*

ONLINE BANKING

Loan Shark

Steep brokerage fees and huge piles of paperwork can make shopping for a home mortgage costly and confusing. New Web-based service HomeShark (888-742-7500, *www.homeshark.com*) claims that it can simplify the process—and at a fraction of the cost.

In partnership with lenders such as BankAmerica and Chase Manhattan Bank (among others), HomeShark allows you to fill out a loan application once—which HomeShark keeps in an updatable, password-protected file—and then use the information in various areas of the service. HomeShark bills itself as a complete home-shopping tool that allows you to compare interest rates, prequalify for mortgages, assess your property's value, and keep yourself updated on good opportunities for you to refinance.

If you're still only dreaming of buying a home, HomeShark offers the Curious Renter's Toolkit, which guides you through the home-buying process, from calculating how much you can afford to choosing a realtor to closing the deal.—*Nancy E. Hirsch*

Rodéo

Ride Into the Future

MMX™ intel inside pentium®

Rodéo
STARTING AT
$4,995*

Intel Pentium®
233MHz Processsor
w/MMX™ Technology
14.1" Display
Ultra Viewing Area
Same as 15" Desktop Monitor
64MB EDO RAM
20x CD-ROM
Dual Lithium Ion Batteries
3.1 GB Hard Drive
56K Fax/Modem
Optional Zip Drive & DVD Ready

Stop By At
COMDEX
Fall '97
Nov. 17-21, 1997
LAS VEGAS
Booth # 5104

Hold On!

We are breaking away from the pack. Introducing Rodéo. All the features of a futuristic computer available today to help you round up your workload. Remember to saddle up with the Rodéo and leave the competition in the mud.

Mo.#	Pentium® Processor with MMX™	Hard Drive	Base/Maximum RAM	Screen Size	Fax/Modem	CD-ROM Drive	Est. Street Price*
3020ECX	Intel Pentium® 233MHz†	3.1GB HDD	64/128 MB RAM	14.1" XGA TFT	56K Modem	20X CD-ROM	$5395.00
3010ECX	Intel Pentium® 200MHz†	3.1GB HDD	64/128 MB RAM	14.1" XGA TFT	56K Modem	20X CD-ROM	$5295.00
3000ECX	Intel Pentium® 166MHz†	3.1GB HDD	32/128 MB RAM	14.1" XGA TFT	56K Modem	20X CD-ROM	$4995.00

Call For A Dealer
Nearest You Or Visit Our Website

AMS Tech
Computers & Peripherals
Putting the Future in Your Hands
800-868-8108
www.amstech.com
12981 Ramona Blvd. • Irwindale, CA 91706
626-814-9851 Fax 626-814-0782

PC Zone
800-252-0286
www.pczone.com

CDW
800-800-4239

TigerDirect
1-800-335-4054
CALL TOLL FREE
REFER TO CODE CKH

FutureCAST Technology, Inc.
888-814-8388
www.fctech.com

DMI
Domestic & Intl. Sales
888-DMI-COMP

NECX Direct
800-808-3375
www.necx.com

Insight
800-INSIGHT
www.insight.com

PC Mall
800-555-6255
www.pcmall.com

The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. All other trademarks and registered trade names are the property of their respective companies. AMS Tech is not responsible for errors in advertising. Prices and specifications are subject to change without notice or cause. †Intel Pentium® processor with MMX™ Technology *Estimated Street Price - Dealer Pricing may Vary

DESKTOP VIDEOCONFERENCING

Up Close & Personal

In this issue's feature story "Desktop Videoconferencing," we test the first consumer-oriented desktop videoconferencing kits that connect over standard dial-up (or analog) phone lines. For connecting over your intranet or the Internet, kits conforming to the ITU's H.323 standard are also arriving on the market.

From Best Data (818-773-9600, *www.bestdata.com*) comes the **PVC100** personal videoconferencing kit, which wasn't ready in time for testing. The $400 (street) package includes a proprietary 32-bit PCI video capture card, a video camera, and an internal 33.6-Kbps fax modem. It also comes with Ulead's Video Studio as well as VDOPhone. You'll be able to capture still and video images and send them over the Internet via e-mail. By buying additional H.324 videoconferencing software, you can also videoconference over analog lines.

SMILE: *Winnov's Videum camera.*

Philips Electronics' **EasyCam** ($500 street) and **EasyConnect** ($300 street) videoconferencing kits let you connect over LAN, WAN, and dial-up Internet connections (800-235-7373, *www.pps.philips.com*). Each comes with the Philips EasyVideo capture board and bundles White Pine's Enhanced CU-SeeME, Asymetrix's Digital Video Producer video-editing software, encoding software, and a capture utility. EasyCam also includes Philips' Desktop Color Camera.

For videoconferencing over the Internet, consider Winnov's a la carte approach (408-733-9500, *www.winnov.com*). The **Videum** line comprises an audio-video capture card ($200 street), a desktop camera ($200 street), and Videum-TV, a tuner module that feeds TV reception to PC desktops ($100 street). The Videum solution works with Microsoft's NetMeeting 2.0, offering audio, dataconferencing, and videoconferencing in compliance with the H.323 standard.—*Toni F. Kistner*

COMBO PC CARDS

Two Birds, One PC Card

Taking your office on the road is easier than ever before, but you can still find yourself lugging around so many devices that keeping track of everything becomes a hassle. Fortunately, you can solve this problem using new multifunction PC cards from Multi-Tech Systems (800-328-9717, *www.multitech.com*), New Media Corp. (800-227-3784, *www.newmediacorp.com*), and Xircom (800-438-4526, *www.xircom.com*).

Multi-Tech's 56 Modem/Ethernet Card ($350 street price) offers 10-Mbps Ethernet and high-speed 56.6-Kbps modem connections that conform to the Lucent/Rockwell K56Flex standard. On the road, you can connect to the office at V.34 speeds or to your ISP with the high-speed downloads that come with K56Flex connections. Once back at the office, you can connect directly to the LAN and even use the modem at the same time. The 56 Modem/Ethernet card is compatible with both Plug and Play and NE2000, and it offers driver support for ODI 3.*x* and NDIS 2.*x* and 3.*x*. It comes with RJ11 and RJ45 cables and flash memory for firmware upgrades to new standards. An automatic sleep mode helps save notebook battery life.

TAKE IT WITH YOU: *Combo cards from Xircom (above) and MultiTech.*

Xircom's **CreditCard Ethernet 10/100+Modem56** ($379 list) does Multi-Tech's product one better by offering both 10-Mbps Ethernet and 100-Mbps Fast Ethernet connections as well as a 56.6-Kbps modem conforming to the K56Flex standard. The card autosenses network speed and offers full-duplex operation, effectively doubling throughput on Ethernet networks that support full duplex. The card is also flash-ROM upgradable and features Xircom's Digital Shield, which protects your modem from high-current digital phone lines. The included Country Select software automatically configures the modem to operate based on local dialing conventions when you are traveling in a foreign country.

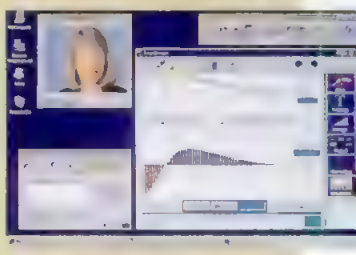
The **NetSurfer Duo** ($500 street) is best suited for road warriors and combination telecommuters. It provides V.34 modem connections only, unlike the 56.6-Kbps connections offered by the other two products. But if you happen to be in a branch office that has ISDN connections, you can achieve up to 128 Kbps over two ISDN B channels using Multilink PPP and get instant connections.—*Leon Erlanger*

EDUCATION

The Virtual Classroom

Corporate education takes on a new twist: ILINC (Interactive Learning International Corp.) has developed the perfect corporate application for videoconferencing: real-time, instructor-led online training (518-283-8799, *www.ilinc.com*).

Instead of flying your new recruits to the main headquarters for training, LearnLinc lets you train them remotely. The latest product, **LearnLinc LAN/WAN 2.0**, lets students see and hear participants in



real-time across a TCP/IP network. A license for 100 concurrent users is $50,000; each additional license costs $500.

The instructor leads the class through a floor-control feature; when an electronic hand is raised, the student simply clicks on a yellow hand icon on their screen—the instructor can then call on that student.

Other features include application viewing, which lets the instructor launch an Excel spreadsheet that students can view and edit. To pass out papers, participants can launch Web-based materials. To look over your shoulder, the instructor can capture a screen shot of your work. There's even a text chat feature that lets you send a private message to the instructor (such as, "Slow down, I'm lost") without interrupting the class.

LearnLinc runs over TCP/IP and requires a multicast router and a 512K digital connection at each site. The software runs on Windows NT Server 4.0—*TFK*

You've spent three days troubleshooting the network. Browser recommendations are due in the morning...and it looks like another night of dining al desko!

At least you don't need to worry about memory.

Let's face it. In this business, your plate is always full.

That's why VisionTek makes memory for corporate IS. Which means we do more than manufacture outstanding components that help improve the performance and extend the life of your technology investments. We bundle them with value-added services that make specing memory easier for you.

Like an experienced corporate sales team that gets to know you and your memory requirements. And that works directly with you on-site to deliver solutions that reduce the total cost of computing.

Add to this memory modules for virtually every system from the leading manufacturers, all built under a quality system that is registered to ISO 9001. Plus world-class tech support and free evaluation units that allow you to test modules in your workplace. When you spec VisionTek, you get attention, service and flexibility that giant vendors simply don't offer. All tailored to your IS needs. So you can sink your teeth elsewhere.

Call your authorized reseller or 1-800-826-9855 today.

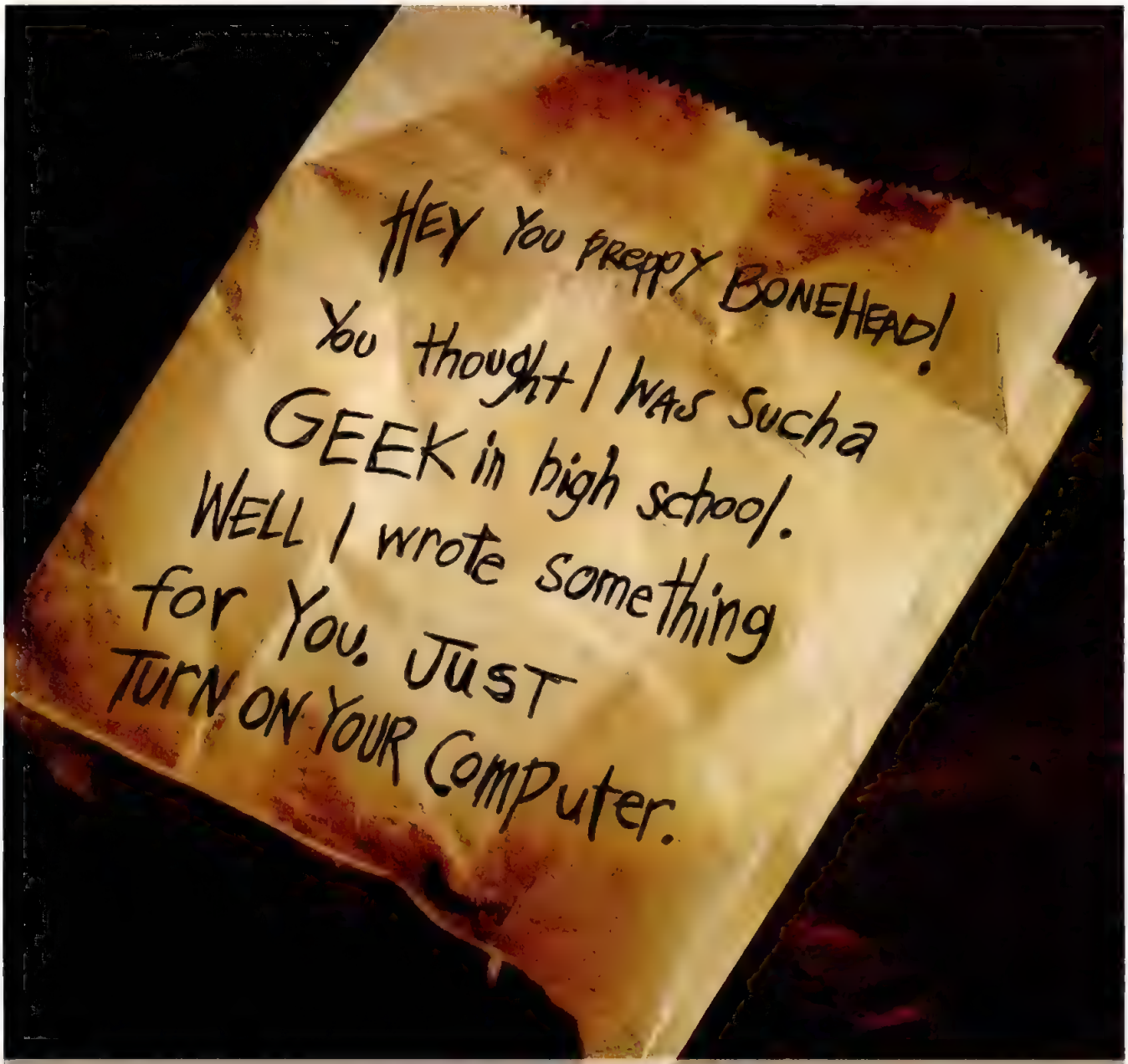
more than memory

visiontek™

http://www.visiontek.com © 1997 VisionTek

VisionTek, Inc.
Registered to ISO 9001
Certified NO. A5241

CIRCLE 065 ON READER SERVICE CARD



All over the world nerds are getting their revenge. By writing computer viruses that get into your computer and do things like destroy your files or corrupt your operating system.

These viruses enter your computer over the internet, through email, or even by sharing computer games.

But VirusScan thwarts these threats completely. Its Hunter Technology detects 100% of the world's known viruses. And our unique SecureCast feature automatically pushes updates to your PC to protect you from the latest virus strains.

Designed for Microsoft® Windows NT® Windows® 95

Novell. TESTED & APPROVED

Maybe that's why VirusScan is the leading anti-virus software, with over 25 million customers.

Install VirusScan on your computer. You'll sleep easier. Even if you didn't insult the guy with the thick glasses back in high school.

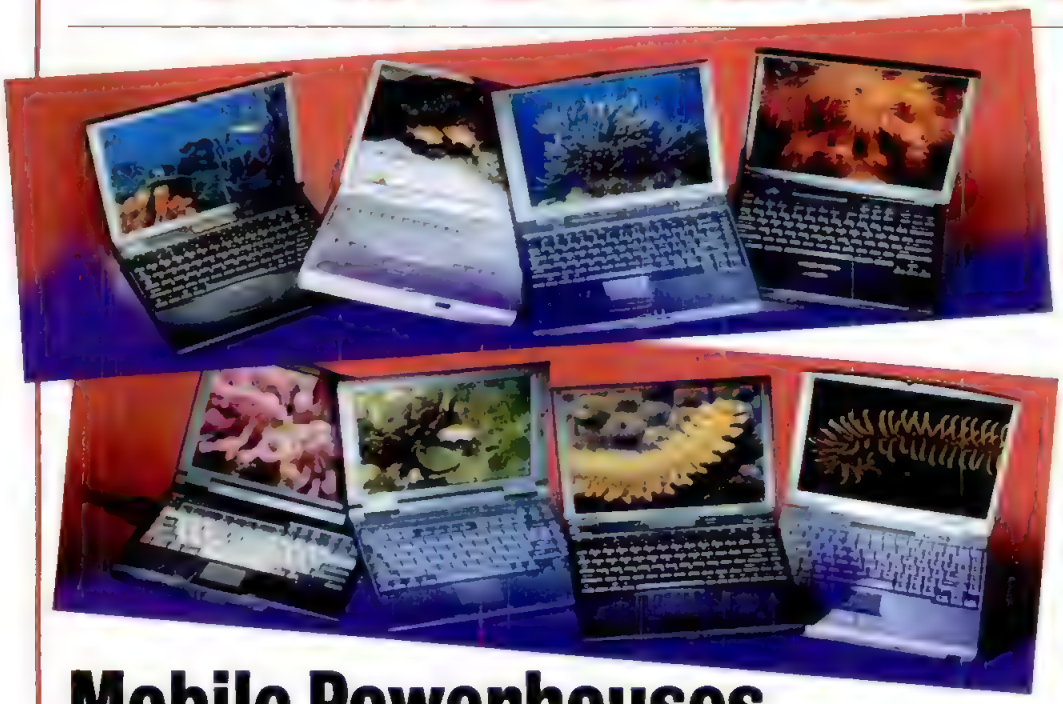
Because there are a lot of sick people out there.

McAFEE®

100% detection rates based upon results from independent industry research from *Virus Bulletin, PC Magazine Labs Review, VSUM Certification Results, Secure Computing* and *Nikkei Personal Computing*. ©1997 McAfee Associates, Inc. All rights reserved. All brands and products are trademarks of their respective holders.

CIRCLE 299 ON READER SERVICE CARD

First Looks



Mobile Powerhouses

Intel's 233-MHz mobile Pentium processor with MMX Technology brings serious horsepower and long battery life to the notebook.—By Carol Venezia

What if you could buy a notebook that was not only faster than the fastest available but got better battery life to boot? Well now you can, courtesy of Intel's new 233-MHz mobile Pentium CPU with MMX Technology.

Introduced at the beginning of September, this newest mobile offering from Intel—perhaps better known by its code name, Tillamook—represents a big technological leap forward. For this processor, Intel uses a brand-new, 0.25-micron manufacturing process; previous generation mobile Pentiums used the 0.35-micron process.

This die shrink—which takes the 4.5 million transistor part from 128 square millimeters to 95—is significant for notebook users in several ways. First, it allows for faster clock speeds. In its debut form, the processor comes in both 200- and 233-MHz flavors. Previously, mobile Pentiums with MMX maxed out at 166 MHz. The processor is available from Intel either on its Mobile Module (MMO)—a snap-in board that integrates the CPU, L2 cache, and part of the core-logic chip set—or in tape-carrier packaging.

Second, the shrink has enabled Intel to lower the processor's voltage both internally and externally. Now, the chip boasts a computational-core voltage of 1.8 and an external I/O voltage of 2.5; these numbers have dropped significantly from 2.5 and 3.3, respectively.

THE SKY IS THE LIMIT

So why should the road warrior care about lower voltage? Because it means less power consumption. Intel claims that the processor's power consumption is over 40 percent less than previous mobile Pentiums. And less power consumption means longer battery life.

Indeed, we verified Intel's claim with our ZD BatteryMark test, which measures a notebook's battery life. We compared the BatteryMark timings of several notebooks here to their 166-MHz brethren, which we tested for our August notebook blockbuster. On average, these 233-MHz units run about an hour longer.

The biggest gain—1 hour 31 minutes—was registered by one of our Editors' Choices in this roundup, the IBM ThinkPad 770. This notebook not only packs a faster processor, but it also comes with a bigger display and hard disk to boot. Our other Editors' Choice, the Micron TransPort XKE, was the battery-life champ of this roundup, clocking an astounding 4 hours 42 minutes on our BatteryMark test (about 30 min-

INSIDE

INGENIOUS ILLUSTRATIONS:

Adobe upgrades its three major drawing packages—Illustrator, Dimensions, and Streamline—for the professional artist. See *page 62* for the review.

SMART COMMUNICATIONS:

Big Island's YoYo telephony software brings new functionality to Caller ID. See *page 68* for the full review.

A DESK-FRIENDLY DISPLAY:

Hewlett-Packard's new 19-inch M900 monitor gives you more viewing area than a 17-inch CRT without taking over your workspace. See the full review on *page 73*.

TELL ME WHERE I AM:

New voice-enabled mapping-software packages from Liikkuva and and TravRoute will get you where you're going, and you don't even need a back-seat driver. See *page 76*.

More Products Reviewed...

Mathcad Professional 7.0 66
Kodak DVC 300 73

PHOTOGRAPHS BY THOM O'CONNOR, SCREEN IMAGES BY CRAIG ELLISON

utes longer than its 166-MHz sibling, an Editors' Choice in our last portables roundup).

IN THIS REVIEW

For this roundup, we tested notebooks with the 233-MHz version of the mobile Pentium/MMX CPU. All are equipped with 32MB of RAM, at least a 2GB hard disk, a 12.1-inch or larger XGA display, and a CD-ROM drive.

This filter netted us the best of the best from Dell Computer Corp., Fujitsu PC Corp., Gateway 2000, IBM PC Co., Micron Electronics, NEC Computer Systems Division, Quantex Microsystems, and Toshiba America Information Systems.

14-INCH DISPLAYS, DVD DEBUT

This roundup afforded us a look at two new and exciting notebook components: A 14.1-inch TFT XGA display panel and a DVD-ROM drive. Both of these high-end enhancements were found in the same machine—IBM's new flagship portable, the ThinkPad 770.

We've come to expect major innovations from IBM ThinkPads, and this system is no exception. The first thing you'll notice when you open it up is the gorgeous screen, which measures 14.1 inches on the diagonal and supports XGA-level resolution.

Look to the right side of the machine and you'll find a DVD-ROM drive (which you can order at launch for November delivery). This drive is supplemented by—among other features—Dolby Digital audio support with the Enhanced Video Adapter installed. At $7,700 (street) with DVD, this notebook is not cheap, but its capabilities and features set are unmatched today.

BANG FOR THE BUCK

You're probably wondering how these machines perform compared with 166-MHz mobile Pentium notebooks. On our ZD Winstone 97 test, which measures overall system performance, these units produced an average score that's about 21 percent higher than the average 166-MHz unit from our August roundup (42 versus 33).

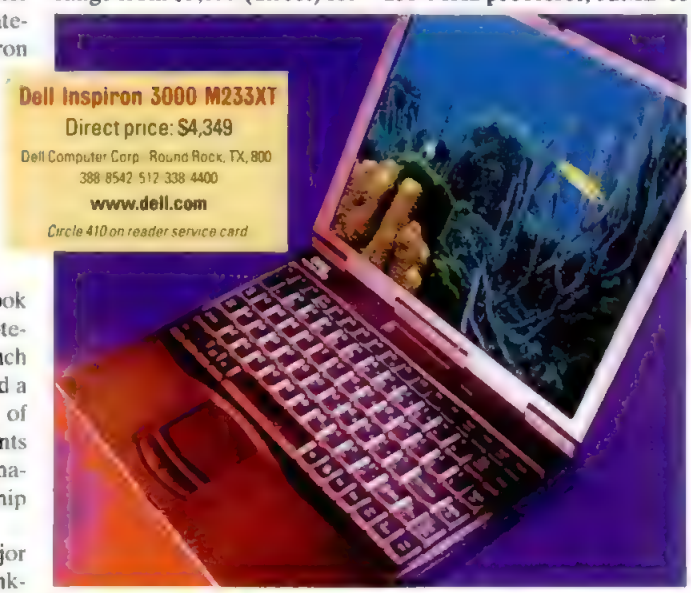
In terms of pricing, these notebooks really aren't that much more expensive than their predecessors. Prices for the notebooks we test here range from $3,899 (direct) for the Quantex Meridian H1330 to $7,700 for the IBM ThinkPad 770 (the average price was about $5,500). The 166-MHz notebooks from our August roundup ranged in price from $4,000 to nearly $7,000, with the sweet spot falling into approximately the same place.

The prices of these notebooks are even more compelling if you consider the cost differential between the 166-MHz mobile Pentium with MMX and the 233-MHz part. In quantities of 1,000, the 233-MHz mobile Pentium/MMX costs $691 per part in TCP form and $764 for the MMO variety. These prices are approximately $200 more than the comparably packaged 166-MHz Pentium/MMX processor ($498 and $586 for TCP and MMO, respectively). And that's just the cost to the notebook manufacturer—the end-user cost is at least double, which means that, not surprisingly, the costs of other components are coming down.

FOR ALMOST ANY BUDGET

Although many of the notebook features in this roundup differ substantially, the basic package remains the same: A 233-MHz processor, 32MB of RAM, 2GB or more of storage, and a 12.1-inch or larger XGA display. This package is quite powerful, as shown by our benchmark tests, and it can be highly affordable.

The majority of the notebooks that we present here would make a great addition to any road warrior's briefcase, be it alligator or canvas. The Dell Inspiron and Quantex Meridian (both manufactured by Compal and virtually identical) are equally terrific, under-$4,500 values; if you can spend between $5,000 and $6,000, check out the NEC Versa and the Gateway Solo. But if you're looking for serious wizbang features and are willing to spend the cash to get them, the products that earn our Editors' Choices are the way to go.



Dell Computer Corp.

Inspiron 3000 M233XT

Part of Dell Computer Corp.'s new line of notebooks, the $4,349 (direct) Inspiron 3000 M233XT targets the same audience as the vendor's Dimension desktop line by offering the latest high-performance technology at aggressively low prices. Built by Compal, this notebook is virtually identical to another machine here, the Quantex Meridian H1330.

The Inspiron 3000 includes a 233-MHz Pentium/MMX CPU, 32MB of SDRAM, a 4GB hard disk, 512K of L2 cache, and a 13.3-inch XGA display. The system also features the NeoMagic NM2160 graphics chip set with 2MB of EDO DRAM.

The Inspiron weighs in at 6.9 pounds with its modular 20X CD-ROM drive installed (adding the AC adapter brings the unit's weight up to 7.6 pounds). The Windows 95 keyboard is responsive and comfortable. The standard touchpad resides just beneath the keyboard, and a pair of speakers resides just above.

The Inspiron's modular bay accommodates either the CD-ROM drive, the floppy disk drive, or a second battery ($179, direct). Next to this bay is the unit's smart lithium ion battery, which lasted 3:12 on our ZD BatteryMark 2.0 test. These components can be conveniently removed by pulling a latch on the underside of the chassis.

In addition to the usual selection of I/O ports, a Fast IR interface and a single USB connector lie at the rear of the machine. A complement of audio jacks, two PC Card slots with Zoomed Video support, and the hard disk are located on the left side.

On the whole, the Inspiron's performance was good. It excelled on some of the tests and showed average results on others. The unit's ZD Business Winstone 97 score was near the

Editors' Choice

- IBM ThinkPad 770
- Micron TransPort XKE

PC MAGAZINE EDITORS' CHOICE

If you're looking for a high-powered portable that's long on battery life, you'll definitely find one in this group, all driven by Intel's new 233-MHz mobile Pentium processor with MMX technology.

But while they're all impressive, only two—the IBM ThinkPad 770, from IBM PC Co., and the TransPort XKE, from Micron Electronics—receive our Editors' Choice.

IBM has long been recognized as a major innovator in the mobile arena, and the company has done it once again with the ThinkPad 770. The system features a gorgeous 14.1-inch XGA display, a DVD-ROM drive, and support for Dolby Digital audio. The ThinkPad's performance—aided by its capacious 5.1GB hard disk and 512K L2 cache—was top-notch across the board. At $7,700 (street), this notebook is not cheap, but its capabilities and features are unequaled.

Our second Editors' Choice—the $5,749 (direct) Micron Transport XKE—is all about power. Packed with a 2.9GB hard disk, 512K of L2 cache, and a 13.3-inch XGA display, the system was a benchmark-test leader, topping the charts on our Winstone, Disk WinMark, and CPUmark$_{32}$ tests. And the TransPort's number-one BatteryMark timing of 4 hour 42 minutes is simply astounding.

Honorable mentions go to the $4,349 Dell Inspiron 3000 M233XT and the $3,899 Quantex Meridian H 1330, virtually identical twins manufactured by Compal. The Inspiron has a slight edge on performance and disk capacity, while the Meridian is the price leader. Either would be a great choice if you want a 233-MHz notebook but don't want to break the bank in the process.

top of the pack, falling just short of IBM, Micron, and NEC. It edged out the Quantex Meridian during ZD Graphics WinMark 97 testing, finishing on a par with the highest scorers here.

With the Inspiron 3000, Dell has put together a strikingly affordable and powerful notebook.—*Cade Metz*

Fujitsu PC Corp.

LifeBook 585Tx

The $5,000 (street) Fujitsu LifeBook 585Tx has one of the slimmest designs in this roundup, with a travel weight—8.1 pounds with AC adapter and CD-ROM drive installed—that's about a pound lighter than most of its competition. This can be attributed to the system's comparatively small 12.1-inch XGA active-matrix display (all of the other notebooks in this roundup have 13.3-inch or larger displays).

The LifeBook features 32MB of SDRAM, a 3.2GB hard disk, and 512K of L2 cache. The graphics subsystem is driven by Trident's Cyber 9385-1 graphics engine and 2MB of VRAM; there's also support for Zoomed Video and MPEG. Two PC Card slots are located at the rear left of the machine, next to a door that covers the external floppy disk drive connector.

The front of the chassis is home to a modular bay, which can accommodate the 20X CD-ROM drive, the floppy disk drive (which can also be used externally), and a second lithium ion battery. The right side features audio jacks, volume control, earphone and microphone jacks, and a PS/2 mouse port.

Fujitsu LifeBook 585Tx
Street price: $5,000
Fujitsu PC Corp., Milpitas, CA, 888 466-8434, 408-935-8800
www.fujitsu-pc.com
Circle 411 on reader service card

Beneath the display are stereo speakers and an LCD status display. An RJ-11 jack for the machine's integrated 33.6-Kbps modem is located at the rear. The design accommodates a comfortable keyboard with Windows 95 keys, but it leaves too little room for the mouse buttons, which are nearly flush with the edge of the wrist-rest.

Unfortunately, the LifeBook's performance was lacking. It posted the second-lowest Business Winstone and Business Graphics WinMark scores and the lowest Business Disk WinMark score. But the big disappointment here was battery life: The unit lasted for only 1:15 on our ZD BatteryMark test. This compares poorly with the competition, which averaged about 3 hours.

In spite of its generous three-year parts-and-labor warranty, the Fujitsu LifeBook 585Tx, compared with the other notebooks in this roundup, is at a disadvantage in terms of both performance and features.—*Melissa J. Perenson*

Gateway 2000 Inc.

Gateway Solo 9100

Using the same chassis as previous systems in the Solo 9100 series, Gateway's 233-MHz Pentium/MMX-based Solo 9100 ($5,349 direct price) incorporates a powerful features set that rivals that of your desktop. You'll also be impressed with its four-hour battery life.

The Solo comes equipped with 32MB of SDRAM, 512K of L2 cache, and a 3GB hard disk. The unit also features a 64-bit Chips & Technologies graphics controller with 4MB of VRAM, and it supports both Zoomed Video and MPEG. Equipped for the road, the Solo

weighs in at just over 9 pounds.

The unit boasts a brilliant 13.3-inch XGA active-matrix display that handles resolutions up to 1,024-by-768. A full-size Windows 95 keyboard is also featured, along with a comfortably sized touchpad. Two speakers are built into the wrist rest, augmenting the Solo's 16-bit wavetable-synthesis sound.

Gateway Solo 9100
Direct price: $5,349
Gateway 2000 Inc., North Sioux City, SD
800-315-2536 605-232-2000
www.gw2k.com
Circle 412 on reader service card

Accessible from the front is a modular bay that takes a combination 10X-speed (average) CD-ROM drive and floppy disk drive—which saves you from taking two separate modules on the road; this bay can also take a second battery. The system's primary lithium ion battery is located to the right of the modular bay; in between sits the hard disk, which is accessible only after you've removed what's installed in the modular bay.

The Solo features two USB ports and a Kensington lock slot located at the right rear, while two Type II PC Card slots are on the left. The volume control is above the PC Card slots, although the headphone jack is inconveniently located at the rear. A 33.6-Kbps PC Card fax modem is bundled with the system. You'll also find an array of I/O ports, including joystick/MIDI, Fast IR, NTSC video-in and video-out, and microphone, line-in, and line-out.

The Solo 9100's test scores were competitive, although slightly lower than the leaders. Its Business Winstone score was in the midrange, but its Business Graphics WinMark score was significantly lower than the top scorers. On the upside, the Solo garnered strong scores on such tests as Business Disk WinMark and CPUmark$_{32}$. The unit's ZD BatteryMark score of 4:03 was the second highest in this roundup. With the Solo 9100, all elements are in place for the power user at an extremely attractive price.—*MJP*

IBM PC Co.

ThinkPad 770

If you're a multimedia-savvy road warrior and think you've seen it all, hang on—you haven't seen IBM's latest jaw-dropping portable, the $7,700 (street) ThinkPad 770, an Editors' Choice in this roundup. IBM has redefined what high-end mobile computing is all about. The ThinkPad includes a 14.1-inch display, a DVD-ROM drive, Dolby Digital audio-out support, a 5.1GB hard disk, and near-3.5-hour battery life.

IBM has redesigned the ThinkPad 700–series case for the newest family member. Gone is the back-tilting keyboard that alternately flipped up for swapping internal components. The keyboard in the new housing is stationary, and internal components load from the sides.

Flip open the lid of this 9-pound (travel weight) PC and you'll find a gorgeous 14.1-inch display. View the notebook from the side and you'll notice that the panel's housing has a slight overbite relative to the body of the machine. To shave weight off the 770, IBM built the casing so that it slopes downward and back in the front, eliminating about a half-pound of plastics. The vendor has also removed excess weight by drilling small holes into the metal casings surrounding the hard disk, CD, and DVD drives.

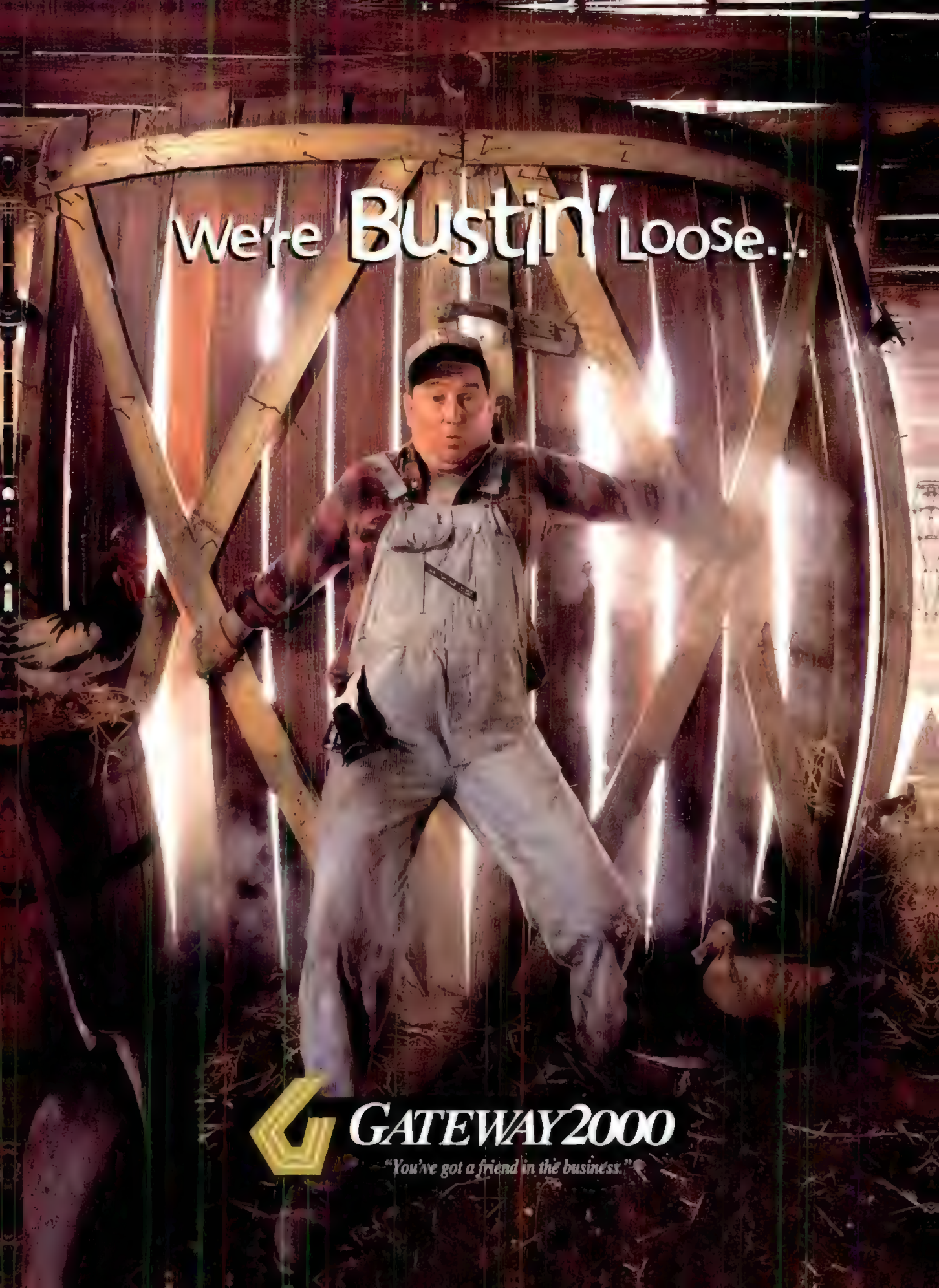
In addition to stereo speakers that augment the unit's SRS

BENCHMARK TESTS

233-MHz Pentium MMX Notebooks

These Pentium MMX/233 notebooks were great performers, posting Business Winstone scores that averaged about 21 percent higher than the average scores of 166-MHz notebooks in our August roundup. The highest Winstone score went to the Micron TransPort XKE, an Editors' Choice. This machine also posted the best Business Disk WinMark score, although it should be noted that the TransPort's high scores on these tests are partly due to its use of Intel's PIIX Bus Master IDE driver for Windows 95 (see page 104 of our September 23 issue for more on this driver).

Bold type denotes first place	ZD Business Winstone 97 Score	ZD Business Graphics WinMark 97 Score	ZD Business Disk WinMark 97 Thousands of bytes per second	ZD CPUmark$_{32}$ Score	ZD CD-ROM WinMark 97 Thousands of bytes per second	ZD BatteryMark Hours:minutes
Dell Inspiron 3000 M233XT	42	80	742	457	837	3:11
Fujitsu LifeBook 585Tx	40	69	662	440	768	1:15
Gateway Solo 9100	41	69	818	458	**1,070**	4:03
IBM ThinkPad 770	43	**81**	837	512	**1,070**	3:23
Micron TransPort XKE	**47**	80	**1,120**	488	936	**4:42**
NEC Versa 6230	45	80	813	**481**	1,050	3:08
Quantex Meridian H1330	41	76	689	429	710	2:52
Toshiba Tecra 750CDT	37	67	725	376	**1,070**	3:20
	BETTER ▶	BETTER ▶	BETTER ▶	BETTER ▶	BETTER ▶	BETTER ▶


We're Bustin' Loose...
GATEWAY2000
"You've got a friend in the business."

...And Ridin' Herd Over the Competition!

When it comes to delivering more for less, stopping the folks at Gateway 2000 is about like heading off a stampede with a motor scooter.

So when component prices started to dive, we cut prices lower than a rattler's belly in a wagon rut. But we reckon that's just the beginning. Gateway field hands also amble around the world, looking for great value and working with component manufacturers to corral fresh technology. On top of that, we've created five broad product lines to meet our customer's diverse needs.

We mean business with our E-Series desktops and servers designed for corporate customers. Gateway Solo™ portable PCs deliver mobile computing power, modularity and flexibility. The Destination™ Big Screen PC/TV rules group computing. The GP-Series handles small office/home office needs. And classic Gateway multimedia value is what the G-Series is all about.

Gateway offers a complete line of systems featuring Intel Pentium® Processors

Quality And Service Wear Our Brand

If you see the Gateway mark branded into the hide of anything, you know it's been tested more times than a bull rider in August and backed by customer service pros who know the business end of a chip set.

To help keep you in the computing saddle, we back all our systems with limited warranties. Call or write for free copies. And once you join the Gateway customer family, you'll have a technical support friend just a toll-free phone call away, 24 hours a day.

Highest Brand Loyalty, Bar None

No wonder an IDC/ACNielsen survey of computer owners showed Gateway had the highest brand loyalty of any computer maker in the U.S. home market, even better than those guys with the fruit logo*.

Give Gateway a holler today and get in on the stampede of value. We'll be glad to cut one from the herd and deliver it to your door.

Based on percentage of computer owners planning to buy another computer of the same brand as they currently own between 11/1/96 and 7/31/97.

New In These Parts?

Not only does Gateway ride herd on the PC stampede for our customers, we're always looking for new things worthy of the Gateway brand that can drive your PC productivity and enjoyment to a whole new level.

Because we talk to about 30,000 customers a day, Gateway has a unique perspective on what folks want in their computers. We also ask Gateway employees who market, build, sell and service our PCs what they think will benefit customers most.

With all that information, we hunker down with customer survey research and huddle with our vendor allies to anticipate when new technology will come onto the market.

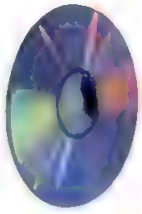
It's all about looking six months or more down the road and lining things up to make it easy for our customers to get the latest technology. Take a gander at the new features we're offering and give us a call.

GATEWAY™ Servers

No matter how big your business is, Gateway servers can ride herd on your data. Fault-tolerant features such as N+1 redundant power supplies, multi-drive RAID support and error-correcting memory help safeguard your data. Choices include **Pentium® II** processors, up to six Pentium® Pro processors and a maximum of 4GB of RAM.

Our servers also feature the InforManager™ manageability subsystem, a series of 30 integrated sensors that monitor temperature, voltage, fan, power supplies and software to let you know if anything needs attention.

DVD (Digital Versatile Disc)

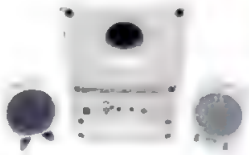


The new multimedia sheriff goes by the initials DVD, and is fixin' to create a whole new standard throughout the computer territories. One Digital Versatile Disc holds 4.7GB of data, a sprawling data prairie that's seven times the capacity of a CD, room enough for up to 133 minutes of video that makes your VCR tapes seem as fuzzy as the Badlands in a dust storm.

EV900 Monitor

A while back, we saddled up some jet airplanes and searched the world for a better monitor. First we found a great monitor tube. Custom designed a case around it. The resulting EV900 is a 19-inch monitor (18-inch viewable) that takes up about the same space on your desktop as our 17-inch monitor (15.9-inch viewable) without skimping on quality.

Boston Acoustics® Speakers



What good is great multimedia if your computer has speakers as tired as a draft horse on Saturday? We sat a spell with the folks at Boston Acoustics and found a way to bring their award-winning sound to our PCs. Gateway yokes these great speakers to some mighty fine sound cards to break new PC audio ground.

Gateway Solo™ Portable Modularity

Our portable components are modular, so many of them can be swapped between different Gateway Solo portables. Now you can mix and match one set of batteries, AC power packs and memory chips between several 2300 and 9100 portables. More flexible than a well-oiled lasso and twice as sleek.

MMX™ intel inside pentium® II PROCESSOR

GATEWAY2000

"You've got a friend in the business."

800-846-2063

www.gateway.com

Prairie Value, City Savvy

When you grow from nothing to $5 billion in 11 years, you tend to know what it takes to run a business. Experience from our own amazing growth and suggestions from our customers, sales groups and manufacturing teams led to our GATEWAY ™ E-Series PCs and servers. After we designed the systems, we put them through extreme network environment tests. Geared just for business, education and government customers, the E-Series line kicks up its heels with:

Manageability — DMI-compliant PCs let your IS team know what's going on without popping the case. The InforManager subsystem in our servers monitors key functions and alerts you of potential failures.

Product Stability — Nothing more annoying than having skitterish PC vendors constantly changing their base platforms. Gateway's solid desktop and server platforms let you standardize on configurations that fit your enterprise. You can manage technology upgrades as they make sense for your particular outfit.

Serviceability — Easy-open cases let you get into our systems in a flash. And our team of highly trained, dedicated technical support pros are ready around the clock just in case you need the digital cavalry.

Flexibility — No matter what size systems you need, you make the decisions on what goes into your E-Series desktop PCs and servers. Your sales rep will listen to your needs and find a configuration that gets it done.

Call your Gateway 2000 Major Accounts sales rep today and we'll charge toward your business goals like a herd of bulls. We mean business.

Gateway Servers

- Intel Pentium® Pro or **Pentium® II** Processors
- A Full Range of Solutions with up to 6-way Processor Support
- Pre-installed High-Bandwidth Network Options
- InforManager™ Subsystem for Server Management
- Variety of High Performance Storage Solutions Including Hot-Swappable Internal RAID

Prices starting at **$2499** *(Quantity 1)*

Gateway E-Series PCs

- Intel Pentium,® Pentium Pro or **Pentium II** Processors
- High-Performance SCSI, EIDE or Ultra ATA Hard Drives
- 2-D or 2-D/3-D Video Adapters
- Pre-installed High-Bandwidth Network Options
- E-Series Low Profile, Desktop or Mid-Tower Case
- Pre-loaded with Microsoft® Windows® 95 or Windows NT® Workstation 4.0
- Hardware Management Features
- Desktop Management Interface (DMI) 1.1 Compliant
- Gateway Gold™ Service and Support for E-Series PCs◆◆

Prices starting at **$979** *(Quantity 1)*

◆◆*E-Series PCs are covered by a three-year limited warranty. Service varies by product. Call or write for details and a free copy of our limited warranty.*

Custom Integration Services

Say your corporation or institution uses a specific inventory control program or certain type of backup storage device.

For volume purchasers, Gateway's CIS crew can help you get some of that hardware or software built into your new systems, pre-tested and shipped to your door. It doesn't matter if we normally sell it or not.

That means you don't have to pay any other outfit to add hardware and software to your Gateway systems. They come right to your corral ready to go to work.

Gateway Extras

(Available only with system purchase.)

- PCI Token Ring Adapter **$149**
  3Com® PCI 10/100 TP Adapter **$49**
  (both upgrades from ISA TPO 10BASE-T Adapter)
- MS® Windows NT Workstation 4.0 Upgrade **$99**
- 3.2GB Ultra ATA Hard Drive
  6.4GB Ultra ATA Hard Drive
  (Call for upgrade pricing.)
- Printers *(Call for information and pricing.)*
- Customized Service Options
  (Call for information and pricing.)

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® II PROCESSOR

GATEWAY2000

"You've got a friend in the business."®

800-846-2063

www.gateway.com/majoraccounts.htm

Gateway E-Series PCs For Business

Computing That's At Home On The Range

Gateway Solo portable PCs are thundering through the mobile computing world, leaving a flutter of blue ribbons and trophies in their wake.

When Gateway's mobile PC crew designed our flagship Gateway Solo 9100 portable they had one priority: features. The result is a portable loaded for bear with features normally found only in desktop PCs. If you're looking for a more classic mobile PC, the 2300 line delivers plenty of power and performance. It's ideal for the corporate fleet.

No matter which portable fits your needs, with Gateway you get:

Modularity — Besides being loaded, Gateway Solo 9100 portables can swap many components with their counterparts in the 2300 series. Now IS can buy one supply of components interchangeable with the entire fleet of 2300 and 9100s. Modularity also helps protect your investment with easily changeable components.

On top of that, all our Gateway Solo portables work with all our docking stations.

Choices — Not only does Gateway have multiple lines of mobile PCs, but you'll never get some pre-built portable that's been sitting on a shelf. Gateway customers decide what goes into their mobile PCs and then we build them fresh and ship them out.

Fresh technology — No hand-me-downs from the desktops here. Gateway gets the freshest mobile PC components on the market and only builds your Gateway Solo portable PC after you order it.

Slip a Gateway Solo portable PC into your saddle bag and you're ready for the road, no matter where you're going.

"Maximum data transfer rate dependent on certain variables including particular modems with which you are communicating, telephone lines, communications software and communications protocols

Gateway Solo™ Portable PCs

2300SE

- 12.1" SVGA DSTN Color Display
- Intel® 133MHz Pentium® Processor
- 16MB EDO DRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- 128-Bit Graphics Accelerator w/ 64K Colors
- Modular 6X min/11X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- USB Ports & Zoomed Video
- NTSC/PAL Video Output
- 2GB Hard Drive
- 16-Bit Sound & Stereo Speakers
- NiMH Battery & AC Pack
- 85-Key MS® Windows® 95 Keyboard
- EZ Pad® Pointing Device
- Casual Carrying Case
- Microsoft® Windows 95
- MS Works 95
- Gateway Gold™ Service & Support for Portable PCs

$2149 As low as* $75/mo.

2300LS

- 12.1" SVGA TFT Color Display
- Intel 150MHz Pentium® Processor with MMX™ Technology
- 32MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- 128-Bit Graphics Accelerator w/ 64K Colors
- Modular 6X min/11X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- USB Ports & Zoomed Video
- NTSC/PAL Video Output
- 3GB Hard Drive
- 16-Bit Wavetable Sound & Stereo Speakers
- PCMCIA 33.6 Data**/14.4 Fax Modem
- 12-Cell Li-Ion Battery & AC Pack
- 85-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- Casual Carrying Case
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold Service & Support for Portable PCs

$3849 As low as* $134/mo.

9100XL BEST BUY

- **13.3" (1024 x 768 resolution) XGA Color Display**
- Intel 233MHz Pentium Processor with MMX Technology via IMM® Package
- 64MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- **4MB EDO Video RAM (1280 x 1024 external)**
- **Removable Combo 6X min/11X max CD-ROM & 3.5" Diskette Drive (allows for second battery pack)**
- USB Ports & Zoomed Video
- NTSC/PAL Video Input & Output with frame capture capability
- 5GB Hard Drive
- Premium Sound System w/ 16-Bit Wavetable Sound & Yamaha Stereo Speakers
- PCMCIA Modem with x2 Technology**
- Two 12-Cell Lithium Ion Batteries & AC Pack
- Full 88-Key MS Windows 95 Keyboard with 19mm pitch & 3mm travel
- EZ Pad Pointing Device
- 15-Pin MIDI/Game Port
- Executive Carrying Case
- Gateway Solo Mini Docking Station
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for Portable PCs

9100XL $5899 As low as* $205/mo.

9100LS $4599 As low as* $160/mo.

200MHz Pentium Processor with MMX Technology, 3GB Hard Drive, 32MB SDRAM, One Li-Ion Battery, Casual Case

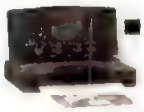
Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)

- Gateway Solo Docking Station **$599**

- Gateway Solo Mini Docking Station **$199**

- Additional 2300/9100 Lithium-Ion Battery **$200** *(with system purchase)*



- Printers *(Call for information and pricing.)*

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® PROCESSOR

GATEWAY2000

"You've got a friend in the business."®

800-846-2063

www.gateway.com

Gateway Solo Portable PCs For The Road

Bigger Than All Outdoors

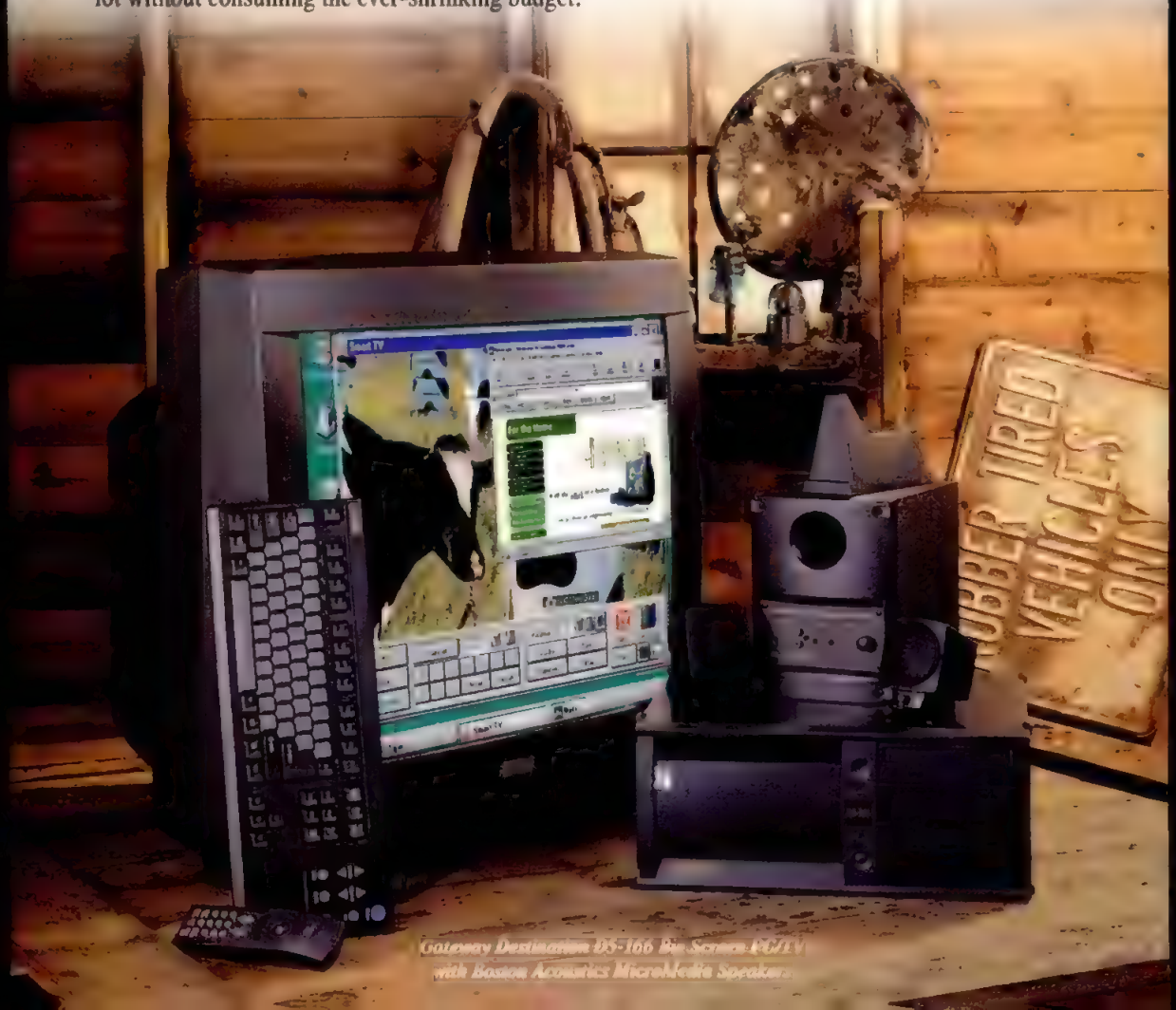
Hailing from South Dakota, wide open spaces have always attracted Gateway. So it's no wonder we invented a whole new computer category by introducing the Destination Big Screen PC/TV in April 1996.

Its huge 31-inch monitor, wireless keyboard and Field Mouse remote make the Destination Big Screen PC/TV a system born and bred for group use. And, with a click of the mouse button, the Destination system becomes a fully functional television. The Destination Big Screen PC/TV includes options like the power of a **Pentium® II** processor and the amazing digital video of DVD. Custom configure one to fit your needs and yank computing out of the den and into the:

Family room — Computing and exploring the Internet just became group activities. After a year on the market, 61% of Destination system owners we surveyed said they spent more time with their families as a result of the Destination Big Screen PC/TV.

Conference room — Now you can combine the presentation power of a big screen computer with the functions of a video system. Add your video cassette player, cable TV hookup and phone line and you've got one system that does it all, at a price that will let you outfit all your conference rooms.

Classroom — How do you teach computer-based lessons to a class? The screen size of a traditional desktop made it tedious at best. Now educators can wheel the Destination Big Screen PC/TV to the head of the class and give all students a great view. And Gateway value delivers a lot without consuming the ever-shrinking budget.



Gateway Destination 9S-166 Big Screen PC/TV with Boston Acoustics MicroMedia Speakers

GATEWAY™ Destination™ Big Screen PC/TVs

D5-166

- Intel® 166MHz Pentium® Processor with MMX™ Technology
- 32MB SDRAM
- 512K Pipelined Burst Cache
- Destination 31" VGA Monitor
- 2MB Graphics Accelerator w/ Cable-Ready TV Tuner
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq® Wavetable Audio
- **Boston Acoustics® MicroMedia™ Speakers**
- TelePath® Modem *for Windows* with x2™ Technology**
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad® Pointing Device
- Wireless Field Mouse® Remote
- Microsoft® Windows® 95
- Home Software Titles
- Gateway Gold™ Service & Support◆ for Big Screen PC/TVs

D5-166 $2499 As low as* $87/mo.

D5-200 $2999 As low as* $104/mo.

(200MHz Pentium Processor with MMX Technology, 4GB Hard Drive, DVD-ROM Drive and DVD Decoder)

D6-233

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 64MB EDO DRAM
- Destination 31" VGA Monitor
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- 4GB 11ms Ultra ATA Hard Drive
- **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- **harman/kardon® High-Fidelity Sound System**
- TelePath Modem *for Windows* with x2 Technology**
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad Pointing Device
- Wireless Field Mouse Remote
- MS® Windows 95
- Home Software Titles
- Gateway Gold Service & Support◆ for Big Screen PC/TVs

$3999 As low as* $139/mo.

◆*The Destination 31-inch monitor is covered by a one-year limited warranty. Call or write for a free copy.*

D6-300XL

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB EDO DRAM
- Destination 31" VGA Monitor
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- PowerVR 3-D Graphics Accelerator
- 8GB 8.5ms Ultra ATA Hard Drive
- **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- **harman/kardon High-Fidelity Sound System**
- TelePath Modem *for Windows* with x2 Technology**
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad Pointing Device
- Wireless Field Mouse Remote
- MS Windows 95
- Home Software Titles
- Gateway Gold Service & Support◆ for Big Screen PC/TVs

$4599 As low as* $160/mo.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)

- Logitech™ WingMan® Extreme™ Joystick **$39**
- Additional Destination 31-inch VGA Color Monitor **$999**
- EasyPhoto Drive™ Photo Scanner **$129** *(with system purchase)*

- Epson® PhotoPC™ 500 Digital Camera **$499**
- Epson Stylus® COLOR 600 Ink Jet Printer **$299**

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® II PROCESSOR

GATEWAY2000

"You've got a friend in the business."

800-846-2063

www.destination.com

Destination Big Screen PC/TVs For Group Computing

Big Systems For Small Operations

The GATEWAY™ GP-Series professional PCs aim to deliver one system that can do many things for small- and medium-sized business. Head-of-the-pack technology lets our GP-Series PCs take care of everything from inventory to accounting. We deliver MMX™ technology across the line and options that include the **Pentium® II** processor, huge backup storage devices and software that can boost business productivity. The GP-Series systems tackle your business needs like a steer wrestler in the championship go-round.

You Call The Shots — Because you know more about your business needs than anyone, you decide what goes into your GP-Series system. Our sales representatives can help you assess your needs and explain your options. But you make the final call.

Fresh Technology — Intel Pentium processors with MMX technology can take care of your business needs, thanks to our philosophy of combining them in fresh configurations. Things like 512K cache, plenty of RAM and Ultra ATA hard drives up to 6.4GB make Pentium processors perfect for your small office/home office needs.

Software That's Part Of The Deal — Gateway knows hardware is just part of the bargain. You also need software, and we've got it in standard and optional packages. So while some companies charge you extra for the basics like anti-virus software and productivity programs, Gateway throws them in with the system, no extra charge.

Gateway GP-Series PCs for the Office Professional

GP5-166

- Intel® 166MHz Pentium® Processor with MMX™ Technology
- 32MB DRAM
- 512K Pipelined Burst Cache
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/16X max CD-ROM & 3.5" Diskette Drives
- GP-Series Desktop Case
- 104+ Keyboard & MS® IntelliMouse™
- Microsoft® Windows® 95 & MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold™ Service & Support for GP-Series PCs

$1449 Business Lease† $54/mo.

GP5-200

- Intel 200MHz Pentium Processor with MMX Technology
- 32MB DRAM
- 512K Pipelined Burst Cache
- CrystalScan®700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Desktop Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for GP-Series PCs

$1749 Business Lease† $64/mo.

GP6-233

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 64MB DRAM
- CrystalScan700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D 64-Bit Graphics
- 4GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for GP-Series PCs

$2399 Business Lease† $88/mo.

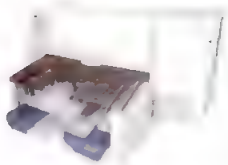
GP6-266 BEST BUY

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 64MB DRAM
- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for GP-Series PCs

$2899 Business Lease† $107/mo.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)



- Hewlett®-Packard DeskJet 820Cse Color Printer **$299**
- TR4 IDE 4GB Tape Backup Unit with Tape **$199** *(with system purchase)*
- TelePath® Modem *for Windows* with x2™ Technology** **$79**
- Iomega® Internal ZIP™ Drive with Two Discs **$99** *(with system purchase)*

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® II PROCESSOR

GATEWAY2000

"You've got a friend in the business."℠

800-846-2063

www.gateway.com

GP-Series PCs For The Office Professional

High-Tech Multimedia, Down-Home Values

No sense in making things complicated. Give customers fresh technology at amazing prices. That's the long and the short of GATEWAY™ G-Series multimedia PCs. These systems deliver the latest multimedia wonders, including MMX technology priced for everyone and the unbeatable value of the amazing **Pentium® II** processor.

By refusing to build even one system before someone orders it and keeping our component inventory among the freshest in the industry, we've spooked our competitors for years.

Gateway constantly searches for the greatest deals on the latest technology, like the **300MHz Pentium II** processor. Then we pack our systems with value and have technical support standing by to help 24 hours a day.

When the **Pentium II** processor was coming out, we took a look-see and discovered this processor was a great deal for *everyone*. So we worked with Intel to secure a processor pipeline so we could deliver for our customers. We moseyed around the globe and found a way to lasso DVD-ROM drives. Same deal on the breakthrough EV900 monitor and the pristine sound of Boston Acoustics speakers.

Looking for something to ease yourself into the computing world or to use as a second system? No problem. Check out the G5-166 multimedia PC complete with printer for $1,499. No matter what your needs or budget, we've got a system that fits.

We're always out there, looking for the great deals and the next technology that will benefit our customers. It's all part of leading the multimedia computing stampede.

Gateway G-Series PCs for the Home

- Intel® 166MHz Pentium® Processor with MMX™ Technology
- 16MB DRAM
- 512K Pipelined Burst Cache
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 1.6GB 12ms Ultra ATA Hard Drive
- 12X min/16X max CD-ROM & 3.5" Diskette Drives
- Ensoniq® Wavetable Audio
- Altec™ Lansing ACS-41 Speakers
- TelePath® Modem *for Windows* with x2™ Technology**
- G-Series Desktop Case
- 104+ Keyboard & Microsoft® Mouse
- MS® Windows® 95 & Home Software Bundle
- ▸ **Color Bubble Jet Printer**
- Gateway Gold™ Service & Support for G-Series PCs

$1499 As low as* $52/mo.

- Intel 200MHz Pentium Processor with MMX Technology
- 32MB DRAM
- 512K Pipelined Burst Cache
- CrystalScan®700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq Wavetable Audio
- Altec Lansing ACS-41 Speakers
- TelePath Modem *for Windows* with x2 Technology**
- G-Series Desktop Case
- 104+ Keyboard & MS IntelliMouse™
- MS Windows 95
- Home Software Titles
- MMX Technology-Enhanced Software
- Gateway Gold Service & Support for G-Series PCs

$1799 As low as* $63/mo.

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 32MB DRAM
- CrystalScan700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D 64-Bit Graphics
- 4GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq Wavetable Audio
- ▸ **Boston Acoustics® MicroMedia™ 3-Piece Speaker System**
- TelePath Modem *for Windows*, with x2 Technology**
- G-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- Home Software Titles
- MMX Technology-Enhanced Software
- Gateway Gold Service & Support for G-Series PCs

$2399 As low as* $84/mo.

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 64MB DRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq Wavetable Audio
- ▸ **Boston Acoustics MicroMedia 3-Piece Speaker System**
- TelePath Modem *for Windows*, with x2 Technology**
- G-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- Home Software Titles
- MMX Technology-Enhanced Software
- Gateway Gold Service & Support for G-Series PCs

$2999 As low as* $104/mo.

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB DRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- TV/FM Tuner Card
- 8GB 8.5ms Ultra ATA Hard Drive
- ▸ **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- ▸ **Boston Acoustics MicroMedia 3-Piece Speaker System**
- TelePath Modem *for Windows* with x2 Technology**
- G-Series Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- Home Software Titles
- MMX Technology-Enhanced Software
- Gateway Gold Service & Support for G-Series PCs

$3799 As low as* $132/mo.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)

- Epson® Stylus® COLOR 400 Ink Jet Printer **$199**
- MS SideWinder™ 3D Pro Joystick **$59**
- Education Software Bundle Grades K-3 or Grades 4-8 **$99** (each)

Please call for current pricing on RAM and other upgrades.

**On-site service is available to most locations in the continental United States, Alaska, Hawaii, Puerto Rico and Canada after you and your Gateway technician determine an on-site visit is necessary. On-site service is provided by PC Technology Services, Inc. On-site is not available for any monitor, mouse, keyboard, E-1000 PC or portable system. Write or call for a free copy of the on-site service agreement.*

MMX™ intel inside pentium® II PROCESSOR

GATEWAY2000 EASYPAY LOW MONTHLY PAYMENTS
Call for details about how you can receive Quicken® Deluxe 6.0.

GATEWAY2000
"You've got a friend in the business."®

800-846-2063

www.gateway.com

Barn Burnin' Values

Get more for your money with GATEWAY™ PCs!

Gateway G-Series Multimedia *PC*

G6-266 BEST BUY

- Intel® 266MHz **Pentium® II** Processor with 512K Cache
- 64MB DRAM
- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq® Wavetable Audio
- **Boston Acoustics® MicroMedia™ 3-Piece Speaker System**
- TelePath® Modem *for Windows*, with x2™ Technology**
- G-Series Mid-Tower Case
- 104+ Keyboard & Microsoft® IntelliMouse™
- MS® Windows® 95
- Home Software Titles
- MMX™ Technology-Enhanced Software
- Gateway Gold™ Service & Support for G-Series PCs

$2999 As low as* $104/mo.

Gateway GP-Series Professional *PC*

GP6-266 BEST BUY

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 64MB DRAM
- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold Service & Support for GP-Series PCs

$2899 Business Lease' $107/mo.

Please call for other configurations. We custom build each GATEWAY 2000® system to your specifications.

Gateway Destination™ Big Screen *PC/TV*

D5-200 BEST BUY

- Intel 200MHz Pentium® Processor with MMX Technology
- 32MB SDRAM
- 512K Pipelined Burst Cache
- Destination 31" VGA Monitor
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- 4GB 11ms Ultra ATA Hard Drive
- **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- **Boston Acoustics MicroMedia 3-Piece Speaker System**
- TelePath Modem *for Windows* with x2 Technology**
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad® Pointing Device
- Wireless Field Mouse® Remote
- MS Windows 95
- Home Software Titles
- Gateway Gold Service & Support◆ for Big Screen PC/TVs

$2999 As low as* $104/mo.

Gateway Solo™ Portable *PC*

9100XL BEST BUY

- **13.3" XGA TFT Color Display**
- Intel 233MHz Pentium Processor with MMX Technology
- 64MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- **4MB EDO Video RAM (1280 x 1024 external)**
- **Removable Combo 6X min/11X max CD-ROM & 3.5" Diskette Drive**
- USB Ports & Zoomed Video
- NTSC/PAL Video Input & Output
- 5GB Hard Drive
- Premium 16-Bit Wavetable Sound & Stereo Speakers
- PCMCIA Modem with x2 Technology**
- Two 12-Cell Lithium Ion Batteries & AC Pack
- 88-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- Executive Carrying Case
- Gateway Solo Mini Docking Station
- MS Windows 95
- MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for Portable PCs

$5899 As low as* $205/mo.

GSA Schedule # GS-35F-4565G

Toll Free from Canada
800-846-3609

Toll Free from Puerto Rico
800-846-3613

GATEWAY2000

"You've got a friend in the business."®

800-846-2063

www.gateway.com

610 Gateway Drive • P.O. Box 2000 • N. Sioux City, SD 57049-2000 • Phone 605-232-2000
TDD 800-846-1778 • Fax 605-232-2023 • FaxBack® 800-846-4526 • International FaxBack Access 605-232-2561
Component Add-On Sales 800-846-2080 • Sales Hours: 7am-10pm Weekdays, 8am-8pm Saturdays & Sundays (CT)

MMX™ intel inside pentium® II PROCESSOR

© 1997 Gateway 2000, Inc. GATEWAY 2000, black-and-white spot design, CrystalScan, EZ Pad, Field Mouse, "G" logo, TelePath and "You've got a friend in the business" slogan are registered trademarks, and Destination, GATEWAY, Gateway Gold, Kid's BackPack and Gateway Solo are trademarks of Gateway 2000, Inc. Not all Gateway E-Series PCs, NS Series servers, Destination systems, G-Series PCs and GP-Series PCs contain the Pentium II processor. The Gateway Solo PC does not contain the Pentium II processor. The Intel Inside Logo, Intel, IMM and Pentium are registered trademarks, and MMX is a trademark of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping or applicable sales tax. Many Gateway 2000 products are custom engineered to Gateway 2000 specifications, which may vary from the retail versions of the software and/or hardware in functionality, performance or compatibility. *Financing available on approved credit issued and administered by MBNA America® Bank, N.A. Payments based on 36-month term at an Annual Percentage Rate as low as 14.9%. 'Leasing arranged by independent leasing companies to qualified commercial customers. Lease payments based on 36-month term. Lease terms subject to change without notice or obligation.

3D audio, the front bezel contains two small latches that flip sideways to release levers. Flip the right lever and whatever is installed in the notebook's UltraBay (whether it's a DVD-ROM drive, a 20X CD-ROM drive, a second 5.1GB hard disk, a second lithium battery, or a floppy disk drive) pops out from the right side of the case. The left-side latch/lever combination is for the unit's primary battery. When the 770 is on, indicator lights let you know when it's safe to swap components.

Another awesome feature of this machine is its Enhanced Video Adapter. It installs beneath the primary battery and has a video-in port (for capturing still or motion video from an analog source) and a video-out port (for connecting to a TV or VCR to send images, such as a DVD movie).

Even the TrackPoint is enhanced in the 770. It supports what IBM calls Press-to-Select: just tap on the TrackPoint once to perform either a left or right click. There's also a new center button located beneath the left and right buttons in the unit's wrist-rest. Depress this button and you can scroll up, down, left, or right instead of using scrollbars. The center button can also be used to enable a magnifying feature for close-up viewing in a defined rectangular area.

There are not enough words listed on this page to describe the IBM ThinkPad 770, so we suggest that you see it in person.—*CV*

IBM ThinkPad 770
Street price: $7,700
IBM PC Co., Research Triangle Park, NC.
800-426-2968, 914-765-1900
www.pc.ibm.com
Circle 413 on reader service card

CD OR DVD: *The IBM ThinkPad's UltraBay supports either a 20X CD-ROM drive or a DVD-ROM drive.*

Micron Electronics Inc.

TransPort XKE

If your priorities encompass speed, innovation, and long battery life, then you should check out Micron Electronics' TransPort XKE. This sleek system—one of our Editors' Choices in this roundup—offers a terrific combination of power and unique features, a double-punch that's made all the more attractive by its $5,749 (direct) price and its near-five-hour battery life.

The Micron TransPort XKE features 32MB of EDO DRAM, a 2.9GB hard disk, 512 of L2 cache, and a 13.3-inch XGA active-matrix display. The system uses NeoMagic's 128-bit NM2160 graphics controller with 2MB of EDO DRAM. There are also two PC Card slots, support for Zoomed Video and MPEG, and an inte-

SUMMARY OF FEATURES

233-MHz Pentium MMX Notebooks

Products listed in alphabetical order	Dell Inspiron 3000 M233XT	Fujitsu LifeBook 585Tx	Gateway Solo 9100	IBM ThinkPad 770	Micron TransPort XKE	NEC Versa 6230	Quantex Meridian H1330	Toshiba Tecra 750CDT
Price of tested configuration (32MB RAM)	$4,349 (direct)	$5,000 (street)	$5,349 (direct)	$7,700 (street	$5,749 (direct)	$4,999 (direct)	$3,899 (direct)	$6,800 (street)
System/travel weight (pounds)	6.9 / 7.6	7.4 / 8.1	8.5 / 9.2	8.2 / 9.1	8.4 / 9.2	7.9 / 8.7	6.9 / 7.6	8.1 / 9.2
Memory type	SDRAM	SDRAM	SDRAM	SDRAM	EDO DRAM	EDO DRAM	SDRAM	EDO DRAM
L2 cache	512K	512K	512K	512K	512K	512K	512K	512K
LCD panel size, type, and resolution	13.3" TFT XGA	12.1" TFT XGA	13.3" TFT XGA	14.1" TFT XGA	13.3" TFT XGA	13.3" TFT XGA	13.3" TFT XGA	13.3" TFT XGA
Graphics chip set	NeoMagic NM2160	Trident Cyber 9385-1	Chips & Technologies 65554	Trident Cyber 9397	NeoMagic NM2160	NeoMagic NM2160	NeoMagic NM128XD	S3 ViRGE/MX 3I
RAM and type	2MB EDO DRAM	2MB VRAM	4MB VRAM	2MB SGRAM	2MB DRAM	2MB EDO DRAM	4MB VRAM	4MB VRAM
Hard disk capacity	4GB	3.2GB	3GB	5.1GB	2.9GB	3GB	2GB	3GB
Modem speed and type	N/A*	33.6-Kbps Integrated	33.6-Kbps PC Card	33.6-Kbps Integrated†	33.6-Kbps Integrated†	56-Kbps PC Card (K56flex)	N/A*	33.6-Kbps Integrated†
CD-ROM speed	20X	20X	6X–11X (10X average)	20X (DVD)	20X	20X	20X	20X
Battery type	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion
Standard warranty	1 year	3 years	1 year	3 years	3–5 years parts, 1 year labor	3 years	1–3 years	3 years
On-site service charge (one year)	$149	Included	N/A**	$50	Included	N/A**	N/A**	$50

N/A*—Not applicable. The configuration we tested did not include a modem. N/A**—Not applicable. The product does not have this feature. † This modem is upgradable to 56 Kbps.

Best of Show Computer TELEPHONY

PC Computing THE A LIST

TELECONNECT Editors Choice

1. Other end of connection must also be camera-equipped to see called party. Compatible with any standard H.324 or VDOPhone Internet video software.
2. All x2 products are capable of 56 Kbps downloads, however due to FCC rules which restrict power output, current download speeds are limited to 53 Kbps. Actual speeds may vary. Uploads from user to provider travel at speeds up to 28.8 Kbps. An x2-capable modem, an x2-compatible analog phone line and an x2-capable Internet service provider are required. See **www.usr.com/x2** for details.
3. Actual performance subject to line conditions and Internet traffic.

©1997 3Com Corporation or its subsidiaries. All rights reserved. 3Com, the 3Com logo and U.S. Robotics are registered trademarks and Bigpicture, the bigpicture logo, RapidComm and x2 and are trademarks of 3Com Corporation or its subsidiaries. All other product names are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies. Product specifications subject to change without notice. Contact your Bigpicture product representative for current product information. #3063 8597

:-) :-(;-)

There are only so many emotions you can capture on a keyboard.

Your complete videophone system that makes being online truly interactive.

bigpicture video

Today you're feeling excited, with a little hint of frustration and slight agitation. Now, how are you going to express those emotions using a semicolon, a colon and a parenthesis?

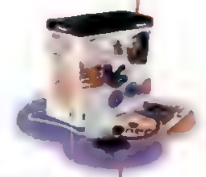
The Bigpicture™ Video Kit provides all the latest technology for full video capabilities on your computer. You can make video phone calls. Capture, edit, and manipulate video. Send video e-mail, and see and speak with others on the Internet at the same time.[1] Or, for even better performance, you can make point-to-point videophone calls over standard analog phone lines.

The Bigpicture Video Kit is an all-in-one video system that includes a top-of-the-line, high-quality color camera with superior focus and built-in microphone for true videophone capability.

Included is a special video-enhanced U.S. Robotics modem that can be upgraded for free with new x2™ technology.

This revolutionary new development lets you download and transmit your audio and video at incredible speeds, making it ideal for video applications that would benefit from a faster, better equipped video-enhanced modem.[2]

You can even send pictures and video you take with your own VHS home camcorder. Just use the video capture card, which can capture video at up to 30 frames per second, to grab moving images directly from those sources for transmission over the Internet, or for placement on your Web page. You can also videoconference at up to 15 frames per second.[3]



The Bigpicture Video Kit also comes with the latest software to edit and manipulate your video footage. Included with Bigpicture products are Asymetrix® Digital Video Producer,® Kai's Power GOO™ Special Edition, RapidComm™ Video, VDOPhone Internet, VDOLive and everything you need for complete communication on your computer.

Call **1-800 DIAL USR** for the dealer nearest you, or visit us at **www.usr.com/bigpicture** and let us show you how really cool the Internet can be.

Bigpicture Video. Because unfortunately, :-) can only say so much.

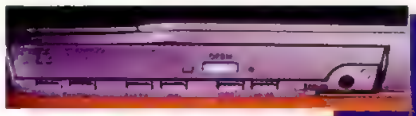
Bigpicture. From the leader in networking. 3Com

grated 33.6-Kbps modem that is software-upgradable to 56.6 Kbps. The Micron TransPort XKE is somewhat hefty, however, with a travel weight of 9.2 pounds.

The notebook's most interesting feature is its 20X CD-ROM drive, which is housed in a modular bay at the front of the system. This drive features convenient, soft-touch buttons for accessing basic CD controls (including volume, fast forward, rewind, stop, and play/pause) as well as a headphone jack. You'll want to have these controls handy, because you can play audio CDs even when the notebook is powered off.

The TransPort XKE has a comfortable keyboard, integrated speakers, and a small-but-tolerable touchpad with buttons that extend just beyond the edge of the wrist-rest. An added boon is the trio of green indicator lights visible even when the cover is closed. One of these lights is for power, a second shows you if the battery is charging, and the third light lets you know whether it's safe to undock the modular bay.

You'll find I/O ports for your cellular phone, RJ-11 line, joystick, USB, video out, and S-Video out. Also available are two PS/2 ports and two Fast IR ports (one in front and one in the back).



TAKE CONTROL: *The TransPort's CD-ROM drive features convenient, front-accessible, Walkman-like controls.*

Micron TransPort XKE
Direct price: $5,749
Micron Electronics Inc., Nampa, ID; 888-634-8799, 208-898-3343
www.micronpc.com
Circle 414 on reader service card

The portable produced some of the best benchmark test scores in this roundup, including the number-one Business Winstone and Business Disk WinMark results. Its BatteryMark score was also the best, at a sky-high 4:42.

Bolstered by a three-to-five-year parts, one-year labor warranty, the Micron TransPort XKE is an ideal notebook for the power user on the go.—*MJP*

NEC Computer Systems Division

NEC Versa 6230

The Versa 6230, from NEC Computer Systems Division, strikes an excellent balance between price and performance. At a travel weight of just under 9 pounds, this $4,999 (direct price) notebook was a highly competitive performer on our benchmark tests. It comes equipped with all of the components that you will need for some serious mobile computing.

NEC Versa 6230
Direct price: $4,999
NEC Computer Systems Division, Boxborough, MA; 888-863-2661, 508-264-8000
www.nec-computers.com
Circle 415 on reader service card.

The Versa's slate-gray case houses a crisp, 13.3-inch XGA active-matrix display, which is driven by NeoMagic's NM2160 graphics engine and 2MB of EDO DRAM. There's also a 3GB hard disk and 512K of L2 cache along with support for Zoomed Video and MPEG.

Versatility is the Versa's middle name. Thanks to the familiar, front-mounted Versa Bay, you can configure the notebook with either a 20X CD-ROM drive, a floppy disk drive, an extra lithium ion battery, or even an Iomega Zip drive (which is a $249 option). A Fast IR port is situated on the front as well. Audio controls are conveniently located on the front-left side of the system, while speakers can be found toward the rear.

We definitely would have preferred the compact touchpad to have been made a bit larger, but it's comfortably centered with the spacebar. When the cover is closed, a green light is viewable, indicating whether the unit is charging. The standard selection of I/O ports is also available, in addition to a USB port and video out. NEC also includes a K56Flex 56.6-Kbps PC Card modem with the system.

The Versa performed well overall, posting above-average scores on both the Business Winstone and Business Graphics WinMark tests. It also posted the top score on the CPUmark$_{32}$ test. The lithium ion battery powered the Versa to a three-hour time on our BatteryMark test.

Backed by a three-year limited warranty, the NEC Versa is an excellent notebook for power users who don't want to sacrifice performance for the sake of price.—*MJP*

Quantex Microsystems

Meridian H1330

Direct-market vendor Quantex Microsystems launches its first notebook line with a system that is almost identical to the Dell Inspiron 3000 M233XT. The Quantex Meridian H1330, priced at $3,899, uses the same chassis design as Dell's Inspiron and much of

SNAPPY™

The PCs Best Picture Grabber Just Got Even More Incredible 3.0

"Now the world's #1 way to get astonishing pictures into your PC is even better with incredible new features, higher quality and it costs less. Is this a cool world or what?"

Kim Stockhammer,
Play Co-Founder
And Technology Evangelist
(Picture Grabbed With Snappy)

Now Only

$99.95

M.S.R.P.*

PLAY INCORPORATED

Get The Free Snappy Demo @

www.play.com 800.306.PLAY

***More Snappy, Reduced Price**

The lawyer words: Play's Snappy and the Snappy logo are ours and thus trademarks of Play Incorporated. All other trademarks acknowledged. Play is a trademark of Play Incorporated. ©1997. All Rights Reserved.

CIRCLE 193 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

When a company is synonymous with the Web, it needs servers that are synonymous with unstoppable. Which explains why **Netscape™ Communications** chooses 64-bit DIGITAL AlphaServer™ systems to help handle the 135 *million* hits its Web site receives daily. Ultra-reliable AlphaServers are also Netscape's primary backup system—because netscape.com simply can't afford to be down. Sheer muscle isn't the whole story, though.

The Webmaster's Prayer

May your content be hot.

Your graphics be cool.

And your servers be DIGITAL.

Scalability counts, too. Witness **AltaVista™ Internet Software**, where AlphaServers run *the* definitive Web search site. Zero to 30 million hits a day, in just 16 months. Plus the herculean task of indexing the entire, ever-expanding World Wide Web. All gracefully accommodated by the flexible, expandable power of Alpha. From servers to software, from networks to global, 24-hour support, DIGITAL delivers total Internet and intranet solutions. In any size, with unlimited room to grow. Call **1-800-DIGITAL, ext. 332**, or surf to **www.ads.digital.com/web**, and make the DIGITAL edge your own. Or sing the Webmaster's Lament: "Gee, I guess we should have gone with DIGITAL."

digital™

Whatever it takes.℠

©1997 Digital Equipment Corporation. DIGITAL, the DIGITAL logo, AlphaServer and AltaVista are trademarks and Whatever it takes is a service mark of Digital Equipment Corp. All other names are trademarks or registered trademarks of their respective companies.

Marc Andreessen
Uber-Webmaster
Netscape Communications

It's New Year's Eve, 1998.

The Jensen & Miller families resolve to get their finances under control.

Margie & Jim Miller balance their checkbook.

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

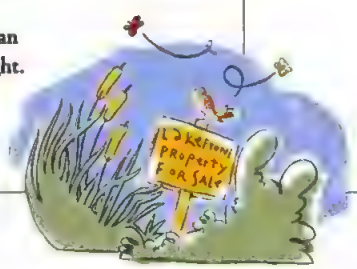
Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

Julia finds the perfect spot to build a new home.



Daughter Patrece skips a grade. College is closer than Julia & Harry thought.

Julia & Harry increase their 401k contributions by $50 per paycheck.

Julia & Harry Jensen get Microsoft Money 98 Financial Suite. They set goals and make plans.

She finds a low-interest land loan through Money Insider. Harry believes Julia is a genius.

Harry starts online trading with Microsoft Investor. Julia supposes genius runs in the family.

The Monthly Reports tell them they're eating out more than they had budgeted for. Harry learns to cook.

Patrece's soccer team wins divisionals. Julia & Harry fly to the nationals.

Advisor FYI encourages Harry to pay off his higher interest-rate loan before his others. He claims he was going to anyway.

Connect time charges may apply. ©1997 Microsoft Corporation. All rights reserved. Microsoft and *Where do you want to go today?* are registered trademarks and Advisor FYI and Money Insider are trademarks of Microsoft Corporation.

Microsoft
Where do you want to go today?®

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

Margie & Jim balance their checkbook.

They pay off their credit card debt—pay cash for Champagne.

Julia & Harry take Patrece to a dude ranch for a two-week vacation.

Harry buys an old sports car to restore. Julia lets him.

Harry's sports car is fully restored. Julia sells minivan.

Julia and Harry spend their second honeymoon sailing the Mediterranean and planning their next 20 years.

Harry beats the S&P 500. Car pool is tired of hearing about it.

Patrece learns how to find a college scholarship through Money Insider, and enrolls in Harry's alma mater.

The family moves into their newly completed home. Patrece can see the lake from her room.

Microsoft® Money 98 Financial Suite elevates you from the monthly exercise of checkbook balancing to take control of your finances and live life as you envision it. Begin by charting your financial future, and stay on track with Goal Planner. Monthly Reports give you an automatically generated overview of your activities and transactions. Personalized guidance from new Advisor FYI™ delivers tips to help you avoid common mistakes. Money Insider™ (moneyinsider.msn.com) gives you online access to financial experts so your decisions will be fully informed. Track your portfolio, trade online, and research potential investments with Microsoft Investor. These components work together so your finances are simultaneously updated with each entry. You know what the most important things in life are. Now Money 98 Financial Suite can help get you there.

For a free 90-day trial of Money 98 Financial Suite, and to see how Julia and Harry did it, visit www.microsoft.com/money/trymoney

the same internal hardware, with the biggest differences being in the graphics memory and hard disk size.

The Meridian's 233-MHz Pentium/MMX CPU is complemented with 32MB of SDRAM, a 2GB hard disk, 512K of L2 cache, a NeoMagic NM128XD chip set with 4MB of VRAM, and a 13.3-inch XGA active-matrix display. As with the Dell Inspiron, the design incorporates an agile keyboard and touchpad, stereo speakers, a modular bay that can swap between a 20X CD-ROM drive and a floppy disk drive, and a smart lithium ion battery (which ran for just under 3 hours on our ZD BatteryMark test).

The 7.6-pound (travel weight) system also has the usual set of I/O ports as well as a USB port, a Fast IR transceiver, and two PC Card slots (one of which supports Zoomed Video). The Meridian's performance on our benchmark tests was average, relative to the rest of the systems in this roundup. The unit finished just a few points behind the Dell Inspiron 3000 M233XT on our Winstone, Disk WinMark, CD-ROM WinMark, and Graphics WinMark benchmark tests.

Quantex backs the Meridian with a one-year parts-and-labor warranty (three years for the processor and the main memory), and it markets the portable toward CAD/CAM artists, business professionals, and SOHO users. Like the Dell Inspiron, the Meridian is an affordable yet adept and well-designed mobile system.—*CM*

Quantex Meridian H1330
Direct price: $3,899
Quantex Microsystems, Somerset, NJ, 800-346-6572, 908-563-4166
www.quantex.com
Circle 416 on reader service card

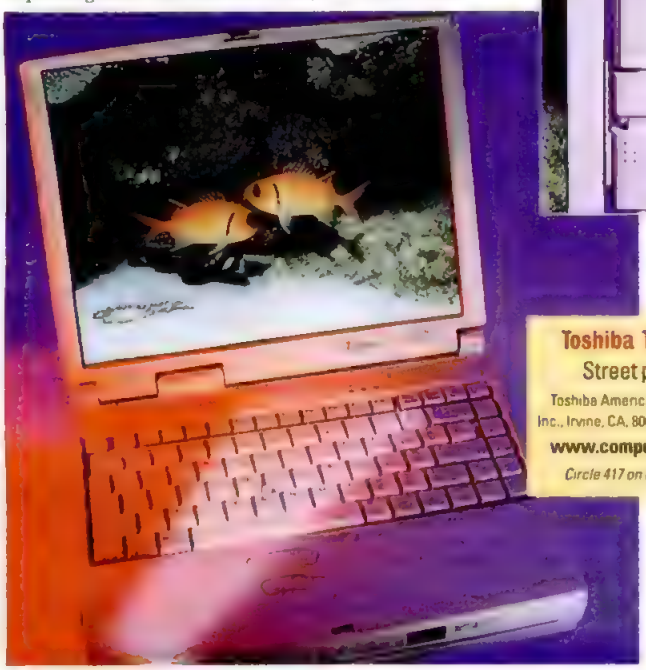
Toshiba America Information Systems

Tecra 750CDT

If you've come to know Toshiba's Tecra 700 machines as ideal portables for communications, presentations, and multimedia, the newest family member, the Tecra 750CDT, will not disappoint you. At $6,800 (street price), this notebook is somewhat expensive, and its test scores were a bit lower than the competition's scores. But if you are looking for advanced features and do not mind carrying 9 pounds worth of notebook, the Tecra is a very impressive system.

The Tecra is all about communications, beginning with its integrated 33.6-Kbps modem, which is software-upgradable to 56.6 Kbps. You'll also notice a new connector on the right side of the case next to the RJ11 jack—it's for a 640-by-480-pixel digital video camera that conveniently clips onto the side of the display.

SNAP OR SCAN: *The Tecra has a clip-on digital camera for capturing stills and motion video; it can also scan.*



Toshiba Tecra 750CDT
Street price: $6,800
Toshiba America Information Systems Inc., Irvine, CA, 800-457-7777, 714-583-3000
www.computers.toshiba.com
Circle 417 on reader service card

Not only is this digital camera simply perfect for videoconferencing with the preloaded Intel ProShare software, but it also doubles as a scanner. The Tecra comes with software (from VideoBrush Corp.) that allows you to edit scanned material, manipulate captured color copy from a whiteboard, and turn any video sequence into a panoramic image. Three-dimensional image rendering is also possible, thanks to the notebook's S3 Virge/MX 3D graphics accelerator with 4MB of VRAM.

Other features of note in this machine include a gorgeous 13.3-inch active-matrix display, front- and rear-mounted infrared transceivers, two USB ports, video-out support, and a 20X CD-ROM drive. This Tecra notebook is also DVD ROM–ready; drives will be available in November through Toshiba's NoteWorthy catalog. And although our test machine came equipped with a 3GB hard disk, a 4.7GB model will be included for the same price by the time you read this.

The Tecra had a bit of trouble on our benchmark tests, posting this roundup's lowest scores on the Winstone and Graphics WinMark tests. On the other hand, it did tie for first place with two other machines on the CD-ROM WinMark measure. These results are partially attributed to two things—first, our system was an early production unit, and second, the Tecra's CPUmark$_{32}$ score was about 15 percent lower than the average score. On the bright side, the unit did last a full 3:20 on our BatteryMark test.

If what you need is a high-powered, well-connected mobile desktop machine, then the Tecra 750CDT is a great choice.—*CV* PC

INTRODUCING THE PERFECT NOTEBOOK FOR 1997. AND 1998. AND 1999...

AST® introduces the long-term notebook solution.

It's very simple. The Ascentia™ M Series from AST provides a full range of powerful technologies designed to support shared peripherals. So, now you don't have to worry about which docking station goes with what notebook, because docking stations and peripherals are common throughout the line, including the next generation of Ascentia notebooks. The result is a simplified notebook solution that will make your job easier today and tomorrow. Visit us at www.ast.com for more information about AST Ascentia M notebooks featuring Intel® Pentium® processors with MMX™ technology. Or call us at 1-800-945-2278.

Ascentia M

Up to 233 MHz Intel Pentium processor with MMX

12.1" DSTN to 13.3" XGA TFT Active Matrix screen

32 to 64 MB RAM expandable to 128 MB

512 KB L2 cache

Up to 4.0 GB UltraDMA hard disk drive

20X maximum speed CD-ROM

Universal Serial Bus and CardBus

Lilon battery

Three docking solutions

Includes choice of Microsoft® Windows® 95 or Windows NT® 4.0

MMX intel inside pentium®

AST. COMPUTER

Working for your business.

© 1997 AST Research, Inc. All rights reserved. AST and the AST Logo are registered trademarks and Working for your business and Ascentia are trademarks of AST Research, Inc. Intel, the Intel Inside Logo, and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation.

CIRCLE 122 ON READER SERVICE CARD

Tim said, "100% Pure Java™ programs give us the latest data from our intranet. So we can all work faster. We can have our products in the stores sooner."

"And we can kick our rivals in the bottom!" said the boss.

Tim and the boss laughed. "Ha, Ha, Ha!"

© 1997 Sun Microsystems, Inc. All rights reserved. Sun, Sun Microsystems, the Sun logo, Java, 100% Pure Java and the 100% Pure Java logo are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries

mul·ti·plat·form ac·cess

to·tal da·ta shar·ing

en·hanced pro·duc·tiv·i·ty

Pure and Simple.

To see how leading banks, freight carriers and telecom firms use 100% Pure Java, visit **http://java.sun.com/100percent/benefits.html** *or simply call us at* **1-800-JAVASOFT.**

BREWED BY

Sun microsystems

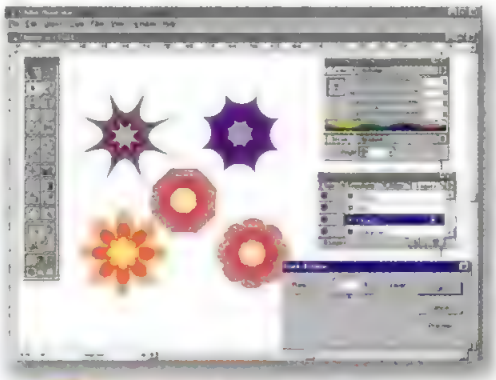
CIRCLE 335 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

ILLUSTRATION SOFTWARE

Draw, Draw, Draw

Adobe upgrades its three drawing programs: Illustrator, Dimensions, and Streamline.—By Luisa Simone

When it comes to vector illustration, Adobe's product offerings for Microsoft Windows have lagged behind their Macintosh counterparts in both features and popularity. Adobe is attempting to reverse this trend with the release of identical Mac and PC versions of three key drawing programs—Adobe Illustrator 7.0, Adobe Dimensions 3.0, and Adobe Streamline 4.0.



PUNK AND BLOAT: *Here, Illustrator's Punk/Bloat and Adjust Color filters were combined to create four variations of three concentric octagons.*

ILLUSTRATOR 7.0

Illustrator's upgrade starts with a radically new interface. Floating palettes bring many of the program's functions—both old and new—to the surface. Like Adobe's PageMaker and PhotoShop, Illustrator now supports right-mouse shortcut menus and tabbed palettes that can be docked and combined to customize the workspace. Illustrator also supports drag-and-drop functions, which include the ability to drag colors between palettes or directly onto objects and the ability to drag drawings directly into other programs, such as PageMaker or PhotoShop.

At long last, Illustrator adds basic features found in every other major drawing program—customizable grids, multiple layers, alignment tools, and gradient fills. But Illustrator puts its own spin on these functions. For example, you create multicolor linear or radial gradients in a palette, but you use the gradient tool to modify the direction and length of the color.

Version 7.0 also contains a host of tools and filters that can speed up the drawing process. The toolbox supplements geometric primatives with more complex shapes, such as multisided polygons, stars, and spirals. Of special note is the Reshape tool, which allows you to mold selected curves on a path while still retaining the macro shape of the outline. New path operators, called Pathfinder filters, let you avoid the drudgery of node editing and quickly combine or subtract shapes from one another.

More sophisticated functions come in the form of vector plug-ins. Illustrator ships with a number of filters that manipulate line segments or anchor points along a path. The Punk and Bloat filters, for example, create convex or concave curves from existing anchor points in order to generate flower and heraldic shapes. Likewise, the twirl filter rotates objects more sharply in the center of an object, creating complex swirls out of simple polygons.

Whether you are using one of the new color-adjustment filters or one of the line-distortion filters, you will still be able to find a unique illustration style thanks to Illustrator's vector plug-ins. The scribble tool, for example, randomly moves an object's anchor points, creating a hand-drawn, imprecise look.

Vector plug-ins are also important because they open Illustrator up to third-party developers. Two that are available now are Vertigo's 3D Words ($99, *www.vertigo3D.com*) and Hot Door's CADtools 1.0 ($129, *www.hotdoor.com*).

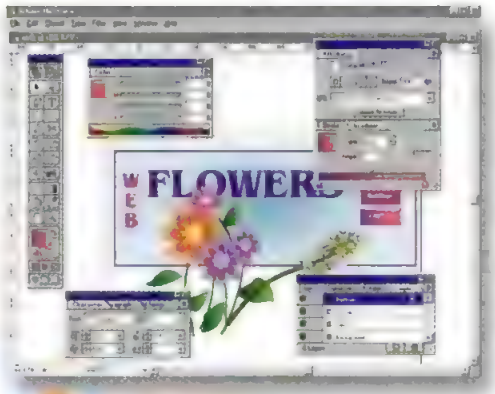
There are a few misses in this otherwise outstanding collection of hits, however. Illustrator's Free Distort function is limited to four anchor points and straight lines—a far cry from Corel's enveloping. And even though the new Character and Paragraph palettes provide access to Illustrator's robust text-formatting functions, you still can't save defined styles.

Illustrator 7.0 handles raster images much more efficiently than its predecessor. You can improve performance by linking to externally stored files instead of embedding large bitmaps. And caching technology significantly speeds up display and performance, even when you incorporate a raster image into a drawing. More importantly, Illustrator 7.0 can now rasterize any vector object within a drawing and modify the resulting raster images using PhotoShop plug-ins. But despite these powerful functions, Illustrator does not yet support bitmapped alpha channels.

Generating four-color separations for traditional print production is easier than ever before, thanks to integrated separation functions. Illustrator handles all the basics, including full control over half-tones and simple traps for objects with solid fills. Kodak Digital Science's Color Management System provides both color-matching functions and RGB-to-CMYK conversions.

Version 7.0 also includes Web graphics. The program offers essential Web publishing tools, including the ability to specify RGB colors, assign URLs to a selected object, and export interlaced and transparent GIF 89a Web-compatible graphics.

Illustrator does not generate a Web-compatible vector format, such as Macromedia Freehand's Shockwave output. If you want to preserve text and vector graphics in your electronic documents, you must export an Acrobat PDF file. The resulting PDF files match Illustrator documents perfectly, but there is currently no way to create hyperlinks from within Illustrator.

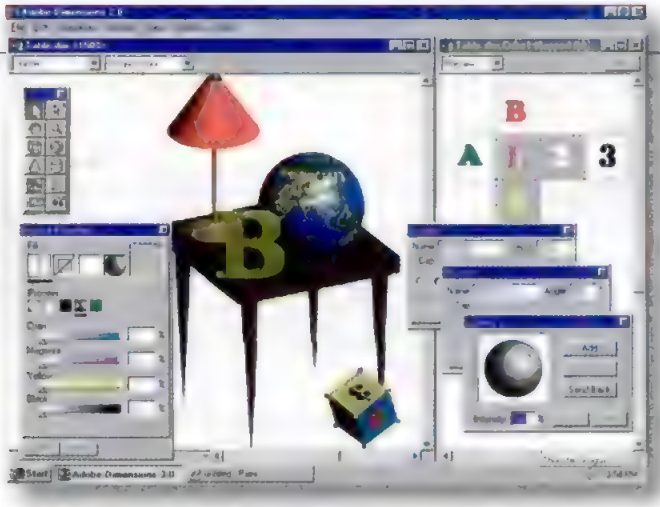


PALETTE POWER: *Illustrator's floating palettes provide easy access to a range of new features, including true gradient fills and organizational layers.*

Illustrator 7.0 is first and foremost a drawing program. Despite all of the new features, it's not a program for someone who wants instant, canned F/X. Although the new tools are designed to speed up the drawing process, they leave the drawing in the hands of the artist.

ADOBE DIMENSIONS

Adobe Dimensions provides 3-D tools to artists who require PostScript output that can subse-



2-D TO 3-D: *In the main window, you can see the results of Dimensions' rendering. It uses a 2-D schematic (shown in the right-hand window) to map artwork onto the surface of a 3-D object.*

quently be incorporated into 2-D illustrations. It offers standard modeling tools, including a handful of 3-D primatives (such as cubes, spheres, cones, and cylinders) and 2-D drawing tools that let you create polygons, bezier curves, and text elements that can be extruded or revolved into 3-D objects.

Numerous viewing options and object-management functions help you work efficiently in a 3-D environment. You can choose one of four preview modes, ranging from a wireframe view to a full rendering of the underlying PostScript code. You can use one of 13 predefined views of the current scene or customize your own camera angle.

The Object Browser lets you easily find and select any element or a component part of an element in a scene. And specialized alignment, rotation, and selection tools allow you to automate or constrain the movement of objects in 3-D space.

Dimensions doesn't offer the broad range of functions found in a full-blown 3-D modeling and animation program. You can create complex objects by overlapping simple shapes, but you can't perform Boolean operations or create mesh distortions. And while Dimensions can track an object's movement in order to generate a sequence of images, it doesn't provide true keyframe animation of multiple objects.

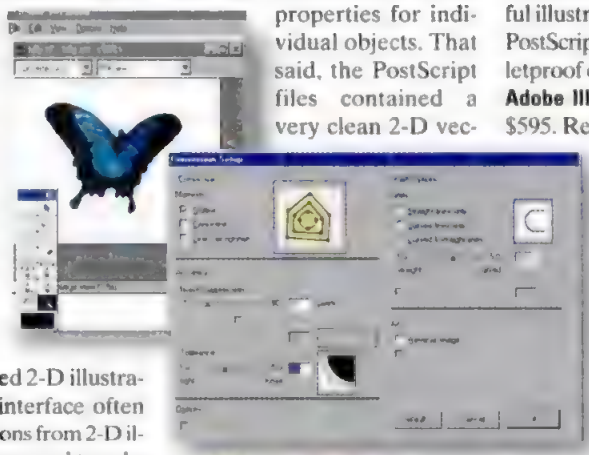
Dimensions is not meant to produce photorealistic renderings. Instead, it renders wireframes as smoothly shaded, hard-edged objects. The surface properties allow you to specify the color and reflectivity of an object, but not advanced options like transparency. Though you can map imported artwork to the surface of a Dimensions object, you can't apply bump or texture maps. You can customize the position and the intensity of lights, but you can't change the color.

The program is exceptionally easy to use, especially if you are an experienced 2-D illustrator. In fact, the interface often borrows conventions from 2-D illustration programs and tweaks them to make them work in a 3-D environment. For example, when you map a raster image to a Dimensions object, the program shows a flattened schematic, which lets you correlate the 2-D surface image to the 3-D object.

Dimensions was designed to work with Illustrator, so it shares key interface conventions. Just like Illustrator, Dimensions offers an object-selection tool and a direct-selection tool. Both tools allow you to select individual faces of a 3-D object. Instead of working in a 3-D world environment, however, you can create a scene on a standard page. Likewise, color-selection methods are limited to print-production color models, specifically CMYK percentages and spot-color libraries like Pantone.

The strong links to print production are most evident at output time. Though Dimensions can output a fully rendered raster image (in TIFF, PSD, or .BMP formats) and export Quicktime's 3DMF format (currently of limited use to Windows users), it is intended to generate resolution-independent PostScript code.

Unfortunately, the separate rendering engines for PostScript and raster output produce significantly different results. If you need to generate the same scene as both vector and raster data, you will be forced to modify the overall lighting setup and the surface properties for individual objects. That said, the PostScript files contained a very clean 2-D vector version of the current view.



AUTO TRACE: *Streamline shows how your choices will affect the resulting vector lines and shapes.*

Illustrators who want total control over 3-D effects in their 2-D drawings will appreciate the powerful tools Dimensions offers and the fully editable PostScript code it outputs.

ADOBE STREAMLINE

Streamline 4.0 rounds out Adobe's illustration arsenal. This classic auto-tracing program now handles an unlimited number of colors to convert photographic raster images into vector format more accurately. The ability to process selection areas (instead of the entire image) lets you choose the best conversion methods for different parts of a picture.

Streamline's improved path handling produces discrete shapes, even when objects share a common border. This makes for easier post-conversion edits. In fact, the program features a number of new vector clean-up functions, such as curve adjustment, path smoothing, and automatic translation of irregular paths to true geometric objects.

Unlike the Corel Graphics Suite and the Freehand Studio bundle, Adobe's Illustrator, Dimensions, and Streamline are marketed as standalone—and thus more expensive—products. But the higher price won't be an obstacle for professional illustrators who are looking for powerful illustration tools, guaranteed PostScript compatibility, and bulletproof output.

Adobe Illustrator 7.0. List price: $595. Requires: 486 CPU, Windows 95 or NT 4.0, 16MB RAM, 25MB hard disk space, VGA graphics adapter, CD-ROM drive.

Adobe Dimensions 3.0. List price: $199. Requires: 486 CPU, Windows 95 or NT 4.0, 16MB RAM, 20MB hard disk space, CD-ROM drive.

Adobe Streamline 4.0. List price: $199. Requires: 486 CPU, Windows 95 or NT 4.0, 16MB RAM, 20MB hard disk space, CD-ROM drive. Adobe Systems Inc., San Jose, CA; 800-649-3875, 408-536-6000; www.adobe.com. *Circle 407 on reader service card.*

Model	G773	P775
Dot Pitch	0.26mm	0.25mm
Recommended Resolution	1,024 x 768 @ 87Hz	1,280 x 1,024 @ 88Hz

Introducing SuperClear.™
A monitor with an image so clear we had to trademark it.

SuperClear. It's the latest advancement in screen performance and, not surprisingly, it comes from ViewSonic®, the biggest company in display technology and the leader in the 17" (various viewable) market.

The focus is on clarity.

The .26mm dot pitch G773 17" (16.0" viewable) monitor sets new standards for image clarity. The reason is our SuperClear screen—ViewSonic's latest engineering breakthrough that combines the exceptional focus found in high contrast conventional CRTs with the bright, vivid colors associated with aperture grille CRT monitors. The result: Absolutely the clearest, brightest images and most vivid colors available on a 17" (various viewable) monitor. At any price. Period.

More specs, more selections, more solutions.

The G773, with 1,024 x 768 resolution at 87Hz, is perfect for general business, home and the internet. If your work requires even higher resolutions, we're also introducing the P775 17" (16.0" viewable) monitor for CAD/CAM, document imaging and prepress applications. This new monitor offers an eye-popping 1,280 x 1,024 resolution at an amazing 88Hz refresh rate.

Keeping an eye on the environment.

And, in keeping with ViewSonic's commitment to environmental concerns, both the G773 and P775 meet strict TCO '95 standards which reduce heat emissions, lower power consumption and mandate the use of recyclable parts. Compliance to TCO certification ensures that our monitors are environmentally and ecologically friendly.

To fully appreciate the clear advantages of the G773 and P775 though, you really need to see them in person.

For the dealer nearest you, call ViewSonic at (800) 888-8583 ask for agent 6597, or visit our website at: www.viewsonic.com

ViewSonic®
See The Difference!

909 869 7976 Fax 909 869 7958 • internet www.viewsonic.com
Specifications subject to change without notice • Copyright © 1997 ViewSonic Corporation. All rights reserved.
Corporate names and trademarks stated herein are the property of their respective companies.

CIRCLE 118 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

MATH SOFTWARE

Tech Apps Take to the Web

Mathcad 7.0 focuses on connectivity to other programs and connections to the Internet.—By Barry Simon

Mathcad has long dominated the market for technical users willing to trade some of the power of the symbolic packages (like Macsyma, Maple, and Mathematica) for ease of use. Even though Mathematica is introducing a more visual interface and Maple and Macsyma are adding simple programming constructs and some symbolic manipulation, they still will prove too challenging for some. Therefore, a certain class of users and potential users will regard the release of the new $400 (street) Mathcad Professional 7.0, from MathSoft, as major news.

Connectivity dominates this new release. An OLE wizard provides control over links that let you pass data between Mathcad and a select set of components, including Excel and Axum, MathSoft's highly regarded technical plotting program. Math Connex—a program for managing data flow between several programs at once—is included in the package. This is an upgrade to Visual Science 1.0, recently acquired by MathSoft.

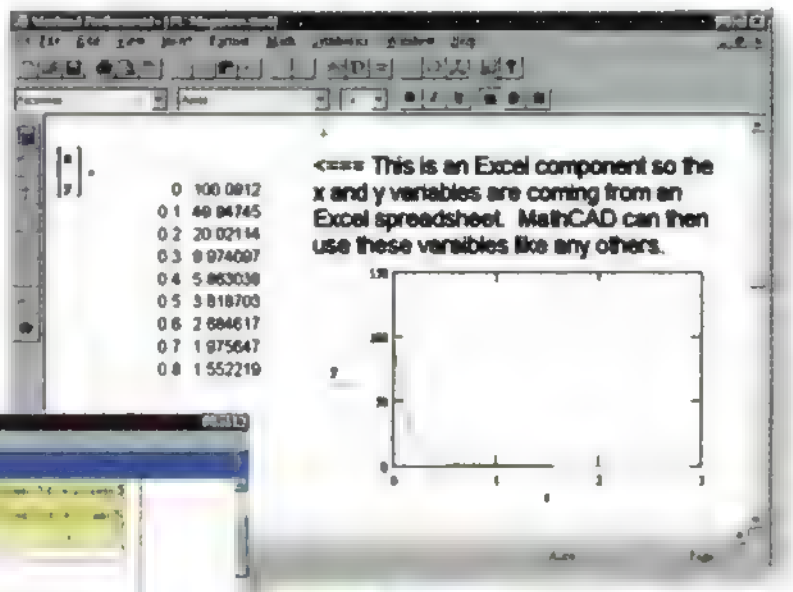
The basic layout and functionality of the program have not changed. Mathcad documents use live math, in the sense that a spreadsheet is live: If you change the value of a variable in a document, the formulas that come afterward are updated. All formulas are displayed in WYSIWYG format, with several toolbars and keyboard shortcuts facilitating formula entry.

Mathematical and technical graphing capabilities are substantial. Numeric calculus, algebraic and transcendental equation solution, and matrix manipulation are all built in. The program has about 20 symbolic procedures licensed from Maple.

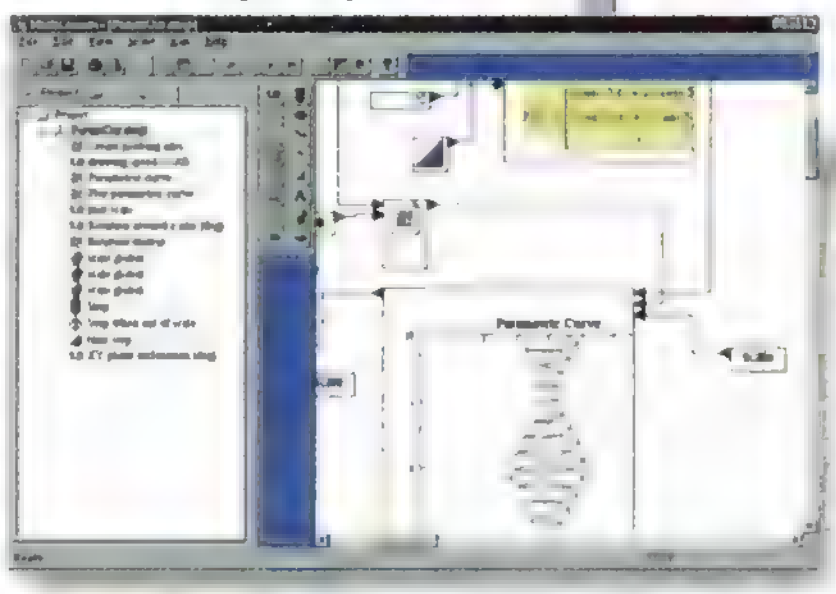
OLE WIZARDRY

New to this version are special OLE components and a component wizard to help place such objects in Mathcad documents. For example, if you want to link data in an Excel spreadsheet to variables in Mathcad, you select Component from the Insert Menu and choose Excel. Dialogs then let you pick one or more input and/or output ranges. If you pick two output ranges, for instance, Mathcad places a standard OLE picture of the spreadsheet; before it, the program puts a vector with two placeholders. You can place variable names in those placeholders and then refer to them or manipulate them in the rest of the spreadsheet.

Also supported via Insert Component is MatLab (Version 4.2c; for Version 5 support, you must download and install the Mathcad 7.01 patch, available at *www.mathsoft.com*), Axum, tables to link to Math Connex, ASCII file read/write, and scriptable objects using either VBScript or JScript. You can also do a normal OLE insertion of the output from any OLE server using Insert Object. In the realm of OLE wizardry, Mathcad is also an OLE server, so you can place pieces of a Mathcad document inside OLE containers such as Microsoft Word.



MATH WIZARDRY: *Excel data can be easily made into Mathcad variables after using the OLE wizard.*



FOLLOW THE FLOW: *Math Connex flowcharts display the logic of data flow between applications.*

MATH CONNEX

Math Connex is a traffic cop that lets you set up complex projects with minimal effort; you can even come back to them months later and immediately understand their logic. The basic paradigm is similar to that used in a high-end scientific simulation package like VisSim or Simulink, but you'll find a much slicker interface and third-party components instead of the built-in solvers of simulation packages.

The program uses a Windows Explorer metaphor, with outlines of a project or available components listed on the left. On the right is a worksheet where you place objects that have inputs and outputs. You use the mouse to join the outputs of one object to the inputs of another. Once you have the model set up, you can run it with visual debugging tools that allow you to place the mouse over a link and see the values of the variables flowing through that link.

HELP AND THE WEB

Apart from a well-constructed conventional help file, Mathcad 7 includes a Resource Center. This opens a window controlled by an Internet Explorer ActiveX control and is made to link to both local resources installed by the program and resources posted on the MathSoft Web site. Included are quick sheets (Mathcad samples that you can drag and drop from the Resource Center window to a Mathcad worksheet), two sample chapters from the Mathcad treasury, a guide to doing statistics with Mathcad, useful reference tables, and a helpful tutorial.

Mathcad has organized a group of online forums to discuss Mathcad issues; a newsgroup-like reader pointing to these forums can be launched from the program's file menu. Because this reader is linked to Mathcad itself, forum messages can have links to Mathcad documents that will open in the main Mathcad window. You can add links to any Mathcad document, which will open a document over the Web, open a local document, or launch a local program.

Mathcad 7.0 begins to meet the promise of OLE by linking together disparate applications in a synergistic manner. This produces impressive technical applications.

Mathcad Professional, Version 7.0. Street price: $400, Requires: Microsoft Windows 95 or Windows NT 3.51 or higher, 16MB RAM, 35MB of hard disk space. MathSoft Inc., Cambridge, MA; 800-628-4223; www.mathsoft.com. *Circle 401 on reader service card.*

Why Not Buy Your Memory From The Same Place Your Computer Manufacturer Did?

Call Us Direct.

RISK FREE!

We thoroughly test each memory module and stand behind it 100%. That means a lifetime warranty (specific terms and limitations apply) and a 30-day, money-back guarantee on every order.

HASSLE FREE!

Never installed memory before? No problem. Our "It's A Snap" installation guide will have you up and running in just a few minutes. Plus, our technical engineers are ready with FREE support if you need it.

SHIPPED FREE!

Free second-day shipping means you'll receive your order in two days or less. (Orders outside the continental U.S. may take longer.)

16 MB MODULES AS LOW AS $74

30-pin SIMM		
1 MB	1x8	$14
4 MB	4x8/9	$37/$43
72-pin SIMM		
4 MB	1x32	$25
8 MB	2x32/36	$44/$69
16 MB	4x32/36	$74/$80
32 MB	8x32/36	$150/$160
72-pin SODIMM		
4 MB	1x32	$33
8 MB	2x32	$44
16 MB	4x32	$77
144-pin SODIMM		
8 MB	1x64	$42
16 MB	2x64	$75
32 MB	4x64	$250
168-pin DIMM		
8 MB	1x64	$49
16 MB	2x64/72	$77/$94
32 MB	4x64/72	$149/$176
64 MB	8x64/72	$300/$344

Volume discounts available.

When your computer has a name like Compaq®, Dell®, Hewlett Packard®, or Gateway® you expect a certain level of quality. That's why the top PC manufacturers in the world have installed over 30 million megabytes of Micron RAM. They know they are installing memory they can trust. And now you can too.

Crucial Technology is a division of Micron, one of the largest RAM manufacturers in the world. When you buy Micron memory from Crucial, you are buying the highest quality memory from the most reliable source.

Remember, not all RAM is created equal. Don't trust your computer with anything less than the best.

Memory Is Crucial.℠

Order anytime, anywhere at
www.micron.com/crucial
Or call us at 1-800-932-4993
M-F 7am - 7pm, Sat 8am-3pm, MST

crucial TECHNOLOGY
Micron Memory Direct

Crucial Technology, 8000 S. Federal Way, P.O. Box 6, Boise, Idaho 83707-0006 Fax: 208-368-3342 International Sales: 208-368-5061, e-mail: crucial.sales@micron.com
Prices subject to change without notice. Call for current pricing. Corporate names and trademarks stated herein are the property of their respective companies. ©1997, Micron Technology, Inc.
CIRCLE 120 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

PERSONAL TELEPHONY

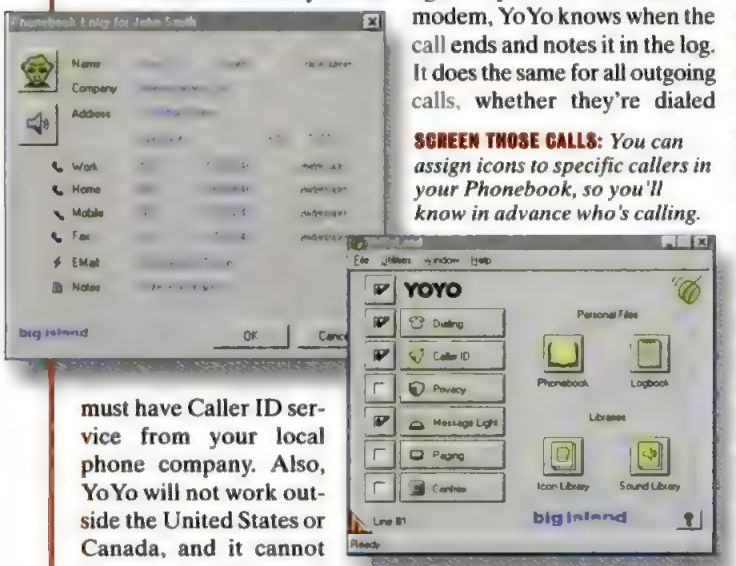
Enhanced Caller ID

Big Island's YoYo can be your personal communications center.—By Daniel Grotta & Sally Wiener Grotta

To most people, Caller ID is either an exciting innovation or a nuisance with limited practical use. Big Island Communication's YoYo ($100 street) is an instantly indispensable hardware/software product that transforms Caller ID into a powerhouse that can dramatically enhance your communications capabilities.

YoYo is so named because the hardware part of it looks like an oversized white yo-yo. It features a slit that flashes either green or red, depending on phone status or the function being used. In addition to Caller ID circuitry, YoYo contains a 1,200-baud modem for autodialing capability, two RJ11 jacks (one for the wall or answering machine, the other for the phone), a three-foot serial cable, and a 9V power transformer.

Of course, the line you use must have Caller ID service from your local phone company. Also, YoYo will not work outside the United States or Canada, and it cannot identify international calls, blocked calls, or calls from areas that don't feature Caller ID.



SCREEN THOSE CALLS: *You can assign icons to specific callers in your Phonebook, so you'll know in advance who's calling.*

To install and initialize Big Island's phone-management program, YoYoLand, you have to follow the instructions to the letter. After installation, you must go to the Control Panel, open Telephony, click on Add, and select The Big Island YoYo TAPI Service Provider. Next, click on Setup, select the COM port, and insert the line name and telephone number.

You'll know YoYo is working properly when the solid green light begins flashing between the first and second rings of the telephone. At the same time, an Incoming Call box will pop onto your computer screen and display the identity and phone number of the caller. When you pick up the handset, the call is permanently logged, the timer automatically begins timing the call, and YoYo's green light stays on. And unlike a modem, YoYo knows when the call ends and notes it in the log. It does the same for all outgoing calls, whether they're dialed manually or via YoYoLand's smart autodialer feature.

Although YoYoLand's telephone directory isn't a full-blown database (it's not possible to add or change fields), you can easily build a customizable list of family members, friends, and business associates either from scratch or by editing intercepted calls. To do so, first click on either the Add button of the Incoming Call window or the Phonebook icon and then fill in the fields. (Some phone companies' Caller ID services flash first names last, but there's a provision for reversing names so that they are posted alphabetically.)

You next assign icons to specific callers from YoYoLand's collection of visual and audio icons. For instance, you can associate a house icon with your home phone number. Then you can either supplement or replace the phone ringer with specific sounds so that you can identify the caller without looking at the screen.

YoYoLand offers various privacy provisions that can be selectively or globally applied. For example, you can set it so the phone won't ring between 3:00 and 4:14 in the afternoon or ignore all callers not in your Phonebook. Unfortunately, this version doesn't allow users to block specific incoming callers.

As a full-time communications center, YoYo can be set to page you or send you an e-mail message regarding incoming calls. YoYoLand also supports Centrex features (Call Waiting, Call Forwarding, Call Hold) by recognizing the specific Centrex service and executing your preset sequence or command.

Remarkably, many of YoYo's features work even with the computer off. Although it doesn't replace your answering machine, YoYo stores all calls made to the phone and then automatically updates the Logbook when the computer is switched on. It can also forward pages and e-mail and activate Centrex features. And if you have a voice mail service such as Message Center or Voice Notes, YoYoLand will notify you when you have messages.

YoYo works with any TAPI-compliant PIM or database, such as ACT!, Maximizer, or DayTimer. This allows users to display information instantly, such as calling history, conversation notes, current order status, and even a photo of the caller. Nevertheless, there are quirks, depending on the program. For instance, ACT! 2.0 will automatically display the correct entry while the program is working in the background, but ACT! 3.0 must be the active window. SideKick works well with YoYo, but only if you manually tweak Setup and Preferences.

As great as it is, YoYo does have some frustrating limitations. It doesn't work with multiple lines, networks, or ISDN lines. Big Island plans to remedy these oversights by releasing additional YoYo products designed for business environments.

Someday, all telephony systems will have YoYo-like capabilities built into their products. For now, YoYo is a product for every telephone and computer business user.

YoYo. Street price: $100. Requires: Microsoft Windows 95, 486 CPU or faster, serial port, 16MB RAM, 10MB disk space, Caller ID, telephone line, optional TAPI-compliant software. Big Island Communications Inc., Mountain View, CA; 800-788-7751; www.big-island.com. *Circle 402 on reader service card.*

PHOTOGRAPHY BY DAVID WHITE

DISCOVER WHY FORD CHOSE THE WORLD'S MOST PRODUCTIVE DIAGRAMMING TOOL.

TAKE NEW FLOWCHARTER™ 7 FOR A FREE TEST DRIVE AT WWW.MICROGRAFX.COM/RIDE

FlowCharter 7 is the driving force behind business process management at Ford Motor Company.

When Ford's Customer Service Division faced the daunting challenge of documenting all of its business processes to obtain ISO 9000 registration, they quickly shifted gears with the diagramming power of Micrografx FlowCharter 7. For their North American operations, FlowCharter proved to be an outstanding tool for understanding, documenting and communicating diverse processes.

Ford is one of many organizations, both large and small, that use FlowCharter. In fact, 60 of the Fortune 100 corporations have found it to be the easiest, quickest and most productive diagramming tool for their business processes.

FlowCharter isn't just another diagramming tool. You can diagram any process across any number of pages, with intelligent lines that automatically re-route, and shapes that quickly drop into place.

New FlowCharter 7 offers more powerful tools than the previous version — ABC FlowCharter. It includes revolutionary Living FlowCharts™ that turn static diagrams into dynamic interactive processes and CoolSheet™ Templates that jump start the most common diagrams. In short, Micrografx FlowCharter bolsters productivity, refines processes, streamlines quality initiatives, helps you attain ISO-9000 certification, and makes your business run smoother.

FlowCharter 7 is also available in Graphics Suite, the only enterprise-wide graphics solution for today's corporation.

Request a FREE full-working 30 Day Trial of FlowCharter 7 at www.micrografx.com/ride. Or call 1-800-428-8709.

MICROGRAFX®

Canada call 800-360-8464. For license pricing on Micrografx FlowCharter, please contact Micrografx directly or call your preferred corporate reseller. ©1997 Micrografx Inc. All rights reserved. All trademarks are owned by their respective companies.

Picture The Possibilities

The Features You Need:

- Pentium® II & Dual Pentium II Processors
- Zip,™ Jaz,® and DVD Multimedia Drives
- High-Resolution Display Adapters & Flat Square Monitors
- Windows NT® & Application Software from Adobe
- Three-year Warranty / One-year Onsite Service

UMAX—GRAP

NT SYSTEMS DESIGNED FOR

UmaxStation 6010

- Intel 233MHz Pentium II processor
- 32MB EDO RAM/512KB Pipeline Burst Cache
- 4GB EIDE Hard Disk Drive
- 24X CD-ROM Drive
- 100MB Zip Drive, 3.5" Floppy Drive
- Matrox Millenium 4MB WRAM Graphics Card
- 17" Flat Square Color Monitor (15.9" v.a.)
- 56Kbps Data & Fax Modem
- 10/100TX PCI Ethernet Card
- Creative Labs 3D Sound, Audio In/Out & Mic ports
- Amplified Stereo Speakers
- Mid-tower Case with 250W Power Supply
- EPP/ECP printer port, (2) 16550 serial ports, (2) USB ports
- PS/2 Keyboard & Microsoft IntelliMouse
- Windows NT Workstation (Windows® 95 available)
- Adobe® PhotoDeluxe,™ Adobe PageMill™ 2.0, Adobe Type Manager,® Lotus SmartSuite®

#S6010.....$2495
Business leases starting at $60/month

UmaxStation 6210

- Intel 266MHz Pentium II processor
- 128MB EDO RAM/512KB Pipeline Burst Cache
- 5GB EIDE Hard Disk Drive
- 24X CD-ROM Drive
- 100MB Zip Drive, 3.5" Floppy Drive
- Matrox Millenium 8MB WRAM Graphics Card
- 17" Flat Square Color Monitor (15.9" v.a.)
- 56Kbps Data & Fax Modem
- 10/100TX PCI Ethernet Card
- Creative Labs 3D Sound, Audio In/Out & Mic ports
- Amplified Stereo Speakers with Sub-Woofer
- Mid-tower Case with 250W Power Supply
- EPP/ECP printer port, (2) 16550 serial ports, (2) USB ports
- PS/2 Keyboard & Microsoft IntelliMouse
- Windows NT Workstation (Windows 95 available)
- Adobe PhotoDeluxe, Adobe PageMill 2.0, Adobe Type Manager, Lotus SmartSuite

#S6210.....$3795
Business leases starting at $92/month

UmaxStation 6410

- Intel 300MHz Pentium II processor
- 128MB EDO RAM/512KB Pipeline Burst Cache
- Adaptec® 2940 Ultra-Wide SCSI-3 Controller
- 4GB Ultra-Wide SCSI Hard Disk Drive
- 24X CD-ROM Drive
- 100MB Zip Drive, 3.5" Floppy Drive
- ELSA Gloria-L 8MB VRAM/8MB DRAM 3D Graphics Accelerator
- 19" Dynamic Focus Color Monitor (18" v.a.)
- 56Kbps Data & Fax Modem
- 10/100TX PCI Ethernet Card
- Creative Labs 3D Sound, Audio In/Out & Mic ports
- Amplified Stereo Speakers with Sub-Woofer
- Mid-tower Case with 250W Power Supply
- EPP/ECP printer port, (2) 16550 serial ports, (2) USB ports
- PS/2 Keyboard & Microsoft IntelliMouse
- Windows NT Workstation (Windows 95 available)
- Adobe PhotoDeluxe, Adobe PageMill 2.0, Adobe Type Manager, Lotus SmartSuite

#S6410.....$5495
Business leases starting at $133/month

Toll Free: 1-888-289-8629 Keycode #203

1-888-BUY-UMAX

www.umaxpc.com

GET CREATIVE

UMAX®

NT Systems for Creative Professionals

Umax understands that creative work requires a special kind of system. That's why we've drawn upon 10 years' experience to develop a new line of NT-based, Adobe-driven workstations that give designers, animators, illustrators, and production artists everything they need. The high-end **UmaxStation** models feature state-of-the-art dual Pentium II 266Mhz processors for maximum power and come bundled with Adobe's latest graphics applications. The **UmaxPC** line of value-priced systems includes many of the same graphics-ready components— Zip drives, high-end video cards, 56K modems— at very affordable prices. Whatever your plans, whatever your budget, we've got a graphics system that will inspire your creativity. These are the machines you need, from a company that knows how to build them.

HICS POWER

CREATIVE PROFESSIONALS.

UmaxStation 9010

- Dual Intel 266MHz Pentium II processors
- 64MB EDO RAM/512KB Pipeline Burst Cache
- Adaptec 2940 Ultra-Wide SCSI-3 Controller
- 4GB Ultra-Wide SCSI Hard Disk Drive
- 24X CD-ROM Drive
- 100MB Zip Drive, 3.5" Floppy Drive
- Matrox Millenium 4MB WRAM Graphics Card
- 17" Flat Square Color Monitor (15.9" v.a.)
- 56Kbps Data & Fax Modem
- 10/100TX PCI Ethernet Card
- Creative Labs 3D Sound, Audio In/Out & Mic ports
- Amplified Stereo Speakers with Sub-Woofer
- Mid-tower Case with 250W Power Supply
- EPP/ECP printer port, (2) 16550 serial ports, (2) USB ports
- PS/2 Keyboard & Microsoft IntelliMouse
- Windows NT Workstation (Windows 95 available)
- Adobe PageMaker® 6.5, Adobe Photoshop® 4.0, Adobe Illustrator® 7.0, Adobe PageMill 2.0, Adobe Type Manager, Lotus SmartSuite

#S9010.....$4995

Business leases starting at $122/month

UmaxStation 9310

- Dual Intel 300MHz Pentium II processors
- 128MB EDO RAM/512KB Pipeline Burst Cache
- Adaptec 2940 Ultra-Wide SCSI-3 Controller
- 9GB SCSI Hard Disk Drive
- 24X CD-ROM Drive
- 100MB Zip Drive, 3.5" Floppy Drive
- Matrox Millenium 8MB WRAM Graphics Card
- 21" DiamondTron Color Monitor (19.7" v.a.)
- 56Kbps Data & Fax Modem
- 10/100TX PCI Ethernet Card
- Creative Labs 3D Sound, Audio In/Out & Mic ports
- Amplified Stereo Speakers with Sub-Woofer
- Mid-tower Case with 250W Power Supply
- EPP/ECP printer port, (2) 16550 serial ports, (2) USB ports
- PS/2 Keyboard & Microsoft IntelliMouse
- Windows NT Workstation (Windows 95 available)
- Adobe PageMaker 6.5, Adobe Photoshop 4.0, Adobe Illustrator 7.0, Adobe PageMill 2.0, Adobe Type Manager, Lotus SmartSuite

#S9310.....$7995

Business leases starting at $194/month

MMX intel inside pentium II

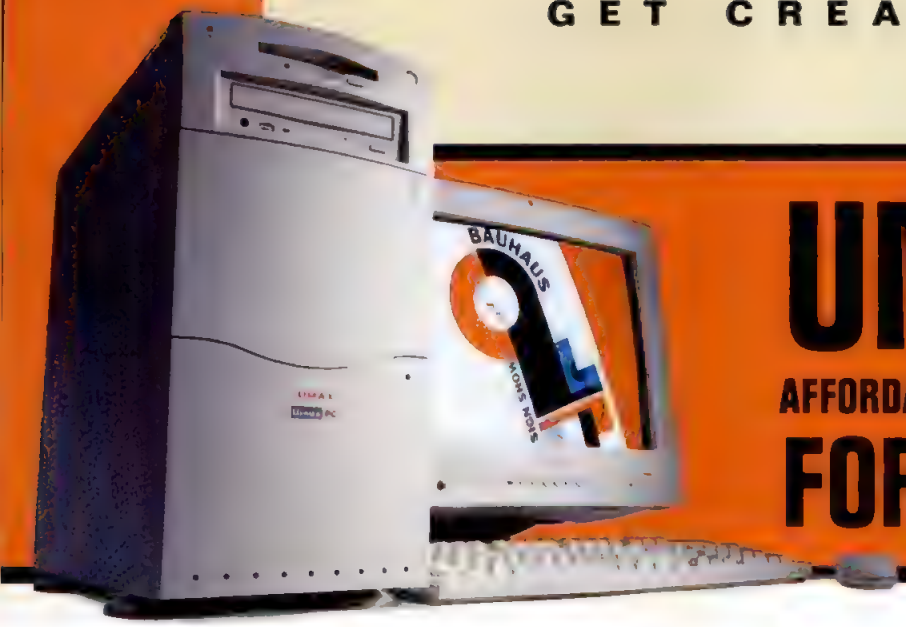
Turn the page to find out more about affordable UmaxPC systems.

1-888-BUY-UMAX

Toll Free: 1-888-289-8629 Keycode #203

GET CREATIVE

UMAX®



UMAXPC.

AFFORDABLE NT GRAPHICS SYSTEMS FOR CREATIVES.

UmaxPC 2010

- Intel 200MHz Pentium processor with MMX™ technology
- 32MB EDO RAM/512KB Pipeline Burst Cache
- 3GB Ultra DMA Hard Disk Drive
- 100MB Zip Drive, 3.5" Floppy Drive
- 24X CD-ROM Drive
- ATI 3D XPression 4MB EDO Graphics Card
- 15" Flat Square Color Monitor (13.7" v.a.)
- 56Kbps Data & Fax Modem
- 10/100TX PCI Ethernet Card
- Creative Labs 3D Sound, Audio In/Out & Mic ports
- Amplified Stereo Speakers
- Mid-tower Case with 250W Power Supply
- EPP/ECP printer port, (2) 16550 serial ports, (2) USB ports
- PS/2 Keyboard & Microsoft IntelliMouse
- Windows NT Workstation (Windows 95 available)
- Adobe PhotoDeluxe, Adobe PageMill 2.0, Adobe Type Manager, Lotus SmartSuite

#P2010.....$1795

Business leases starting at $43/month

UmaxPC 2210

- Intel 200MHz Pentium processor with MMX
- 32MB EDO RAM/512KB Pipeline Burst Cache
- 4GB Ultra DMA Hard Disk Drive
- 100MB Zip Drive, 3.5" Floppy Drive
- 24X CD-ROM Drive
- Matrox Millenium 4MB WRAM Graphics Card
- 17" Flat Square Color Monitor (15.9" v.a.)
- 56Kbps Data & Fax Modem
- 10/100TX PCI Ethernet Card
- Creative Labs 3D Sound, Audio In/Out & Mic ports
- Amplified Stereo Speakers
- Mid-tower Case with 250W Power Supply
- EPP/ECP printer port, (2) 16550 serial ports, (2) USB ports
- PS/2 Keyboard & Microsoft IntelliMouse
- Windows NT Workstation (Windows 95 available)
- Adobe PhotoDeluxe, Adobe PageMill 2.0, Adobe Type Manager, Lotus SmartSuite

#P2210.....$2195

Business leases starting at $53/month

UmaxPC 2410

- Intel 233MHz Pentium processor with MMX
- 64MB EDO RAM/512KB Pipeline Burst Cache
- 5GB Ultra DMA Hard Disk Drive
- 100MB Zip Drive, 3.5" Floppy Drive
- DVD Multimedia/CD-ROM Drive
- ATI 3D XPression 4MB EDO Graphics Card
- 19" Multi-Step Dynamic Focus Color Monitor (18" v.a.)
- 56Kbps Data & Fax Modem
- 10/100TX PCI Ethernet Card
- Creative Labs 3D Sound, Audio In/Out & Mic ports
- Amplified Stereo Speakers with Sub-Woofer
- Mid-tower Case with 250W Power Supply
- EPP/ECP printer port, (2) 16550 serial ports, (2) USB ports
- PS/2 Keyboard & Microsoft IntelliMouse
- Windows NT Workstation (Windows 95 available)
- Adobe PhotoDeluxe, Adobe PageMill 2.0, Adobe Type Manager, Lotus SmartSuite

#P2410.....$3295

Business leases starting at $80/month

Options for UmaxStation and UmaxPC systems:

- 15" Flat Square Color Monitor (13.7" v.a.) **$285**
- 17" Flat Square Color Monitor (15.9" v.a.) **$485**
- 19" Dynamic Focus Color Monitor (18" v.a.) **$985**
- 21" DiamondTron Color Monitor (19.7" v.a.) **$1345**
- 4x/6x Yamaha Recordable CD-ROM **$675**
- Iomega® Jaz Drive **$345**
- Adobe Premiere® 4.0 .....**$495**
- Adobe After Effects® **$645**
- Iomega Ditto™ 3200 Tape Drive **$195**
- Adaptec 2940UW SCSI Controller **$185**
- Yamaha Stereo Speakers with Sub-Woofer **$115**
- Three-Year Onsite Extended Warranty **$125**

Ordering

To order, call 1 888-BUY-UMAX between 6 am and 6 pm Monday-Friday, and 9 am and 6 pm Saturday-Sunday (Pacific time). To configure your system online, visit our web site at www.umaxpc.com. We welcome payment by Visa, MasterCard, Discover, American Express, wire transfer, money order, or check. Check orders are held 5-10 days for clearing. Purchase Orders from major corporations, government offices, and educational institutions are gladly accepted.

Warranty

All UmaxPC and UmaxStation systems are backed by the Umax 30-day Moneyback Satisfaction Guarantee and are covered by a three-year limited warranty with one year of onsite service. For a complete copy of our guarantees, limited warranties, or service policies, please write to Umax Systems Sales, 3485 Kifer Road, Santa Clara, CA 95051, or visit our web site at www.umaxpc.com.

Shipping

Umax offers a variety of shipping services, ranging from UPS Groundtrack to Federal Express Priority Overnight. Please ask your salesperson for details regarding pricing and availability.

Technical Support

Technical support for UmaxPC and UmaxStation systems is available 24 hours a day, seven days a week. Additional technical support is provided by the publishers of software bundled with Umax systems. Complete information on technical support is included with each system

Umax Technologies, Inc. is not responsible for omissions or errors in typography or photography. Prices and specifications valid in the U.S. only and subject to change without notice. All purchases are subject to availability, and are subject to Umax Technologies current terms and conditions of sale. Prices do not include shipping and handling. 30-day money back guarantee policy does not include return freight and original shipping handling charges; applies only to UmaxPC brand products, and begins on the date of shipment. Onsite service is provided by an independent third party provider and may not be available in certain remote locations. The Intel Inside logo and Pentium are registered trademarks, and MMX is a trademark of Intel Corporation. MS, Microsoft Windows, and Windows NT are registered trademarks of Microsoft Corporation. All other trademarks or registered trademarks are property of their respective companies.
© 1997 Umax Technologies, Inc.
All rights reserved.

MMX™ intel inside pentium® PROCESSOR

Toll Free: 1-888-289-8629 Keycode #203

1-888-BUY-UMAX

CIRCLE 242 ON READER SERVICE CARD

www.umaxpc.com

Umax Systems Sales
3485 Kifer Road Santa Clara CA 95051-0711
408 617 0270 • Fax 408 735 0222

MONITORS

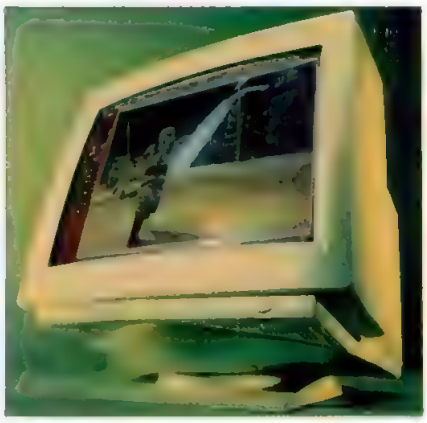
Wide-Angle Viewing

HP's M900 19-inch monitor maximizes display size without taking over your desk.—By Bruce Brown

For users lacking the desk space or budget to move up to a 21-inch monitor, the new category of 19-inch monitors introduces a terrific compromise. A very impressive entrant into this burgeoning market is Hewlett-Packard's M900 ($1,075 street). This monitor offers easy-to-use controls via front-panel buttons and on-screen indicators and good screen-geometry regulation, focus, and image color—all at an affordable price.

The M900 uses a 0.26-dot-pitch Invar shadow mask flat-square tube. Maximum noninterlaced resolution is 1,600-by-1,200 at an eye-friendly 75-Hz vertical refresh pitch; 640-by-480, 800-by-600, 1,024-by-768, and 1,280-by-1,024 resolutions can all run at an even steadier 85 Hz, the highest rate possible without wasting valuable system resources.

The monitor has all the desired credentials, including EPA Energy Star and Nutek power-saving compliance; DDC 1/2B VESA Plug & Play support; MPRII, MPRIII Level B, and TCO95 emissions guidelines; and Automatic Display Power Management when used with HP Vectra PCs. It also has a three-year warranty.



PICTURE THIS: *The 19-inch HP M900 supports 1,600-by-1,200 resolutions at 75 Hz.*

The M900 is only 3.5 percent deeper than a comparable HP 17-inch monitor, but it has 32 percent more image surface (18 percent less than a 21-inch monitor). The M900's physical dimensions are 17.9 by 17.6 by 18.1 inches (HWD). This means you'll have plenty of on-screen real estate at little cost to desk space.

If you really need the largest possible screen size for design work, a 21-inch monitor is a necessity. But if you require maximum display space without compromising your budget or giving up too much of your desk, then the HP M900 is a terrific choice.

HP M900. Street price: $1,075 Hewlett-Packard Co., Palo Alto, CA. 800-322-4772; fax, 800-312-9300; www.hp.com. *Circle 403 on reader service card*

DIGITAL CAMERAS

Photos Via USB

Kodak brings the first USB device to market with its DVC 300.—By Daniel Grotta & Sally Wiener Grotta

Kodak's $200 DVC 300 Digital Video Camera is the first USB (Universal Serial Bus) product we've seen. Being first does not necessarily make it the best, so the question is, how well does the DVC 300 perform?

This unconventional, futuristic palm-size camera is primarily designed to nestle in a swivel cradle, but it can also be detached from the cradle and used as a point-and-shoot still or video camera.

The DVC 300 lacks a built-in microphone, but its software can record sound with any add-on microphone and sound card. Its only controls are an oversized start/stop/shutter button on top and a knurled focusing ring above the pea-size 6.2-mm glass lens.

Kodak bundles a multimedia program called PictureWorks Live instead of videoconferencing software. And in addition to light-image and video-editing tools, it offers a wide variety of resolutions—160-by-120 to 320-by-240 for video and up to 640-by-480 for stills—and either a large or small display window. Although USB has the bandwidth to move data for full-motion video (30 fps) at resolutions up to 640-by-480, the DVC 300's compression rate allows you a maximum speed of only 24 fps, and then only at its lowest resolution. A more typical recording speed is 4 to 7 fps at higher resolutions, so the better the image quality, the jerkier the motion.

IT'S TINY: *Kodak's DVC 300 digital camera fits in the palm of your hand.*

Like all USB devices, the DVC 300 can be hot-plugged or unplugged. Installation is true Plug & Play, although (depending on your PC's graphics board) you may have to go into Windows 95's Control Panel to turn off hardware acceleration. You may also need to go into Control Panel's Multimedia section to remove any other camera drivers, or else the video capture may not work properly.

PictureWorks Live has several user-changeable parameters that set image quality and size, color intensity and white balance, and also video recording. The latter may be used to set continuous, time-lapse, or stop-frame recording and to toggle sound on or off.

The camera's CCD has a relatively low sensitivity to light and needs lots of illumination to get a perfect picture. Despite the fact that you can manually tweak color intensity and balance, we had difficulty getting the right color and exposure in mixed sunlight and fluorescent lighting.

Operating the DVC 300 is both fun and easy. Framing and focusing is done via the computer and by moving the camera about. There's a toggle between video and still capture; to shoot, click on the Take Picture/Record button. It takes about 3.6 seconds to record, convert, and upload still images to the computer.

The DVC 300's image quality is generally good, especially for electronic display. If your PC has the USB ports to support this device, it's a fun and inexpensive way to get your feet wet in the world of digital photography.

Kodak DVC 300. Street price: $200. Requires: USB-equipped Pentium PC (MMX recommended), Windows 95 Version OSR2 or later, 16MB RAM (32MB recommended), VGA or SVGA graphics card, 10MB disk space. Eastman Kodak Co., Rochester, NY; 800-235-6325, 716-726-7260; www.kodak.com. *Circle 404 on reader service card.*

PHOTOGRAPHY BY DAVID WHITE

We're Going To Change The Way You Look At Desktops. (From The Inside Out.)

The newest Compaq® Deskpro® PC models are proof positive that looks can be deceiving. Sure, they come with the Compaq quality, reliability—and desktop design — we're known for. But just look at how much new technology we've managed to fit inside.

Looking for a powerful Pentium® processor with MMX™ technology? Check out our new Deskpro 2000 and 4000 models. Exciting new graphics? You've got it — from the new S3 Trio 64V2/GX Enhanced 64-bit graphics in the Deskpro 2000 to the phenomenal Matrox Millennium graphics of the Deskpro 6000. Plus bigger hard drives. SDRAM memory, standard. And up to 16X CD-ROMs — with audio — on selected models. It's all inside.

Whichever Deskpro you choose, you'll find it has several additional features that set it apart as a Compaq: Innovation. Affordability. Advanced technology. Ease of use. Plus Intelligent Manageability, standard. So take a closer look at the new Compaq Deskpro today. You'll find there are a lot of exciting new things happening inside that familiar exterior.

Deskpro 2000

Deskpro 4000

Deskpro 6000

DESKPRO	Model 2000	Model 4000	Model 6000
Processor	166MHz Pentium with MMX	200MHz Pentium with MMX	266MHz Pentium II
Standard Memory	16MB DRAM	32MB DRAM	32MB EDO RAM
Hard Drive	2.1GB	3.2GB Ultra ATA	4.2GB SCSI
Standard Cache/Max.	256KB / 512KB	512KB / 512KB	512KB / 512KB
Video Graphics	S3 Trio 64 V2/GX	S3 ViRGE/GX	Matrox MGA Millennium
Video Memory/Max.	1MB / 2MB SGRAM	2MB / 4MB SGRAM	2MB / 8MB WRAM
Diskette Drive	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB
Expansion Slots/Drive Bays	5/5 Desktop	5/4 Desktop	5/4 Desktop
Ports: Serial/Parallel/USB	2/1 ECP/2	2/1 ECP/2	2/1 ECP/0
Intelligent Manageability	Yes	Yes	Yes
CD-ROM	Optional	Optional	8X with Sound
Software Pre-installed	Windows 95	Windows 95	Windows NT for Workstation
Limited Warranty*	3-Year	3-Year	3-Year
Price† *Other Models Available*	**$1,239**	**$1,759**	**$3,179**

COMPAQ

1-800-345-1518
Or Visit Us At www.compaq.com For More Information Or For A Reseller Near You

intel inside
pentium® PROCESSOR

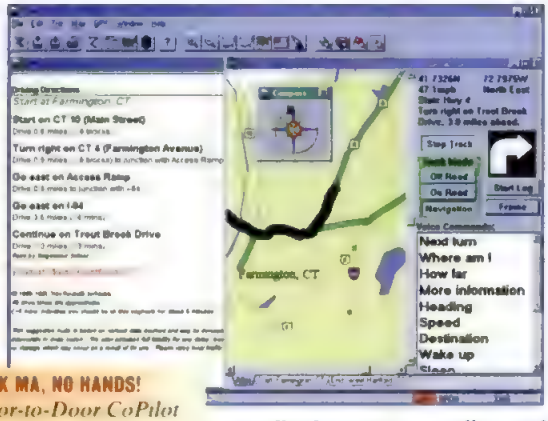
Monitors not certain regions are covered by a One Year Limited Warranty. *Compaq Deskpro are covered by a Three Year Limited Warranty. Restrictions and exclusions apply. †All prices shown are estimated street prices and do not include monitors. Reseller prices may vary. Offer available in the U.S. only. © 1997 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq logo are registered U.S. Patent and Trademark Office. Products, prices and programs are subject to change without notice. Windows and Windows NT are registered trademarks of Microsoft Corporation. Deskpro is a registered trademark. The Intel Inside Logo, Pentium, and MMX technology are registered trademarks and the Pentium Pro xeon Logo is a trademark of Intel Corporation. Other products are trademarks of their respective companies.

IN-CAR MAPPING SYSTEMS

PC Backseat Driving

Retki MetroGuide and Door-to-Door CoPilot give vocal driving directions on the road.—By Bruce Brown

You can rent a car from Hertz with the NeverLost In-Car Navigational System (a $6-per-day option) or drive a BMW with a $2,800 BMW On-Board Navigation System; otherwise, the only way you'll get voice directions while driving is from other passengers. New products from Liikkuva Systems International and TravRoute Software can help tell you where to go by using routing software, a notebook PC, and a GPS unit—with no back-seat driver required.



LOOK MA, NO HANDS! *Door-to-Door CoPilot recognizes a fixed set of voice commands for hands-free navigational inquiries.*

Liikkuva's Retki MetroGuide 2.0 for Windows 95 ($169 list without GPS) and TravRoute's Door-to-Door CoPilot ($499 list including GPS) both give you turn-by-turn directions without requiring you to look at the screen or use the keyboard when the car is in motion.

Neither programs' street data is 100 percent accurate, though both claim to be close. Both have one-way street information in covered areas, but route changes, road construction, and local conditions guarantee a degree of fallibility.

GPS tracking with civilian signals has a potential 150-meter error range. Trees, tall buildings, and poor weather conditions further complicate things. The upshot is, you can't turn driving-direction control over to your computer completely. Those caveats aside, Retki MetroGuide and Door-to-Door CoPilot can help you plan routes, track your location, and anticipate your next turn.

RETKI METROGUIDE 2.0

Retki MetroGuide 2.0 for Windows 95 is most useful in—or traveling between—big cities. MetroGuide uses the same cross-road, point-of-interest, and address databases as the Hertz and BMW systems, with similar digital maps, turn indicators, and speed, heading, and voice directions. MetroGuide can help you find a restaurant, police station, or other point of interest by name or type in each major metropolitan area.

The NavTech database covers the U.S. on nine regional CD-ROMs, one of which comes with MetroGuide 2.0. Additional discs cost $99 each, or $495 for the full set. You can use MetroGuide with all NMEA-compliant GPS devices, but Liikkuva does sell the program with a serial-interface GPS receiver for $399 or a PC card receiver for $549. It depicts GPS signal reception and satellite location graphically (along with speed and heading indicators).

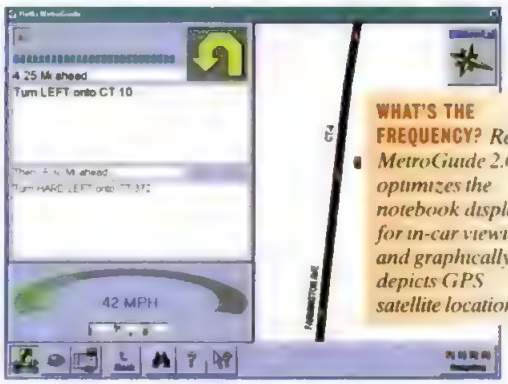
When you use MetroGuide, a synthesized voice alerts you to the name and distance of your next turn. If you haven't printed trip directions, you can skip forward and backward from turn to turn to see and hear directional and distance information. On our tests, MetroGuide's information was accurate in metropolitan areas and useful even without a clear GPS signal.

DOOR-TO-DOOR COPILOT

Door-to-Door CoPilot helps you navigate the entire continental U.S., and it has a Rockwell chip-based, 12-channel serial GPS. TravRoute's data covers the U.S. on a single CD-ROM, including over 95 million addresses.

CoPilot dynamically recalculates directions if you miss a turn. In addition to spoken directions, it adds voice recognition for a limited set of commands, so you can inquire about current location, turns, speed, and headings. CoPilot doesn't include point-of-interest data, but it's still a superior program for in-car navigation.

CoPilot lists phone numbers for major airlines, hotels, rental car agencies, and state tourism departments, but you'll need a paper directory with street addresses for specific destinations. Once you enter the street address in the trip planner, Door-to-Door's routing engine calculates the route quickly.



WHAT'S THE FREQUENCY? *Retki MetroGuide 2.0 optimizes the notebook display for in-car viewing and graphically depicts GPS satellite location.*

As you travel with a GPS connected, a unique feature directs the on-screen location-indicator arrow to follow your calculated route. If you deviate from the route by 300 meters (twice the maximum GPS error factor), CoPilot will quickly recalculate it for you. The voice-recognition feature worked well during testing, although open windows, radios, and hands-free cellular phone conversations can result in unexpected vocal responses from CoPilot.

For $20, an optional cassette interface plugs into the PC's headphone jack to play through your car stereo system. Frequent travelers may find it convenient to mount a microphone on the dashboard and external notebook speakers in the back of the vehicle and just leave the notebook running on the back seat.

You can print maps and driving directions with Door-to-Door CoPilot, but the combination of voice recognition and response and dynamic rerouting makes TravRoute's country-wide routing a great value for business travelers.

Retki MetroGuide 2.0 for Windows 95. List price: $169 with one regional CD-ROM; $495 for a set of nine CD-ROMs; $99 per single CD-ROM. Requires: 486 PC or better, 16MB RAM, 300MB hard disk space, CD-ROM drive, Windows 95. Liikkuva Systems International Inc., Cameron Park, CA; 800-997-3854, 916-676-0676; www.liikkuva.com. *Circle 405 on reader service card.*

Door-to-Door CoPilot. List price: $499; street price: $400. Requires: Pentium PC or higher, 16MB RAM, 100MB hard disk space, 4X CD-ROM drive or better, Windows 95 or Windows NT. TravRoute Software, Princeton, NJ; 888-872-8768; fax, 609-252-8166; www.travroute.com. *Circle 406 on reader service card.*

Unreal 233 MHz prices from a real company.

With over 125 industry awards in the last 4 years and a history of outstanding product reviews from the leading computer publications, WinBook is a proven innovator in notebook computer design. In fact, notebook computers are all we make.

FX
WinList
Sept.'97

FX
Best Buy
Sept.'97

FX P133
Honorable Mention
Aug.'97

FX P166 MMX
Best Buy
Aug.'97

Combine this with our outstanding reputation with programmers, MIS professionals and technical experts in the field and you'll understand why we say that WinBook computers are *"Critically Proven."*

To prove it to yourself call 1-800-725-3437 today.

- **WinBook FX- 166 MHz Intel® Pentium® Processor with MMX™ Technology, running at 2.5V**
- *12.1" SVGA Active Matrix Display*
- *32 MB EDO DRAM*
- *2.16 GB removable Hard Drive*
- *59-Watt Hour Lithium Ion Battery*
- *256K Syncburst L2 Cache*
- *33.6 Internal Fax/Data Modem*
- *Options Bay accepts CD-ROM, 3.5" floppy drive (both included) or optional 2nd battery*
- *Integrated dual-button pointing stick, optional touchpad*
- *16-Bit Stereo Audio*
- *One Type II/III & one Type II PCMCIA Slot*
- *PCI Graphics Accelerator*
- *Parallel, Serial, PS/2, VGA, and one 2-way Infrared port*
- *One-year extendible warranty*
- *Microsoft Windows® 95 installed*

$2999 *Add $199 for an extra battery or $219 for a Mini Dock*

- **WinBook XL- 233 MHz Intel® Pentium® Processor with MMX™ Technology, Running at 1.8V**
- *12.1" SVGA Active Matrix Display (add $400 for 13.3" Display*
- *32 MB EDO DRAM*
- *3 GB Hard Drive*
- *45-Watt Hour Lithium Ion Smart Battery*
- *256K Syncburst L2 Cache*
- *3.5" Floppy Drive and 20x/8x variable CD-ROM both built-in*
- *Integrated dual-button pointing stick and touchpad, both active simultaneously*
- *16-Bit Stereo Audio*
- *Two Type II or one Type III PCMCIA Slot*
- *PCI Graphics Accelerator w/2 MB DRAM*
- *Parallel, Serial, PS/2, VGA, 2-way Infrared port, TV out*
- *One-year extendible warranty*
- *Microsoft Windows® 95 installed*

$3599 *Add $400 for a 13.3" screen*

Call Now: 800-725-3437

Mon-Fri 8am-9pm EST Sat 9am-4pm EST

U.S. sales only. 30-day unconditional money-back guarantee from date of purchase.

WinBook

Critically Proven.

©1997 WinBook Computer Corporation. All rights reserved. WinBook is a registered trademark of Micro Electronics, Inc. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of the Intel Corporation. All other trademarks and registered trademarks are property of their respective corporations. All prices and specifications are subject to change without notice or obligation. Prices do not include shipping.

IN AN INDUSTRY THAT
IT'S COMFORTING SOME
BEST
Dell By itself at the top of the class,
with fewer reliability problems.
GOOD
FOR THE SECOND YEAR IN A ROW DELL IS IN THE
TOP TIER FOR OVERALL RELIABILITY AND SERVICE.

THRIVES ON CHANGE, THINGS DON'T.

NEW DELL DIMENSION™ XPS D300
300MHz PENTIUM® II PROCESSOR FEATURING MMX™ TECHNOLOGY

- 64MB SDRAM Memory
- 512KB Integrated L2 Cache
- *NEW* 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- *NEW* 1200HS Monitor (17.9" v.i.s.)
- *NEW* Matrox Millennium II 8MB WRAM Video Card*
- 24X Max.§ Variable CD-ROM
- Creative Labs AWE64 Value Sound Card
- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer
- 56K Capable** U.S.R. x2 WinModem
- Iomega Zip 100MB Internal Drive
- Microsoft® Office 97 Small Business Edition plus Bookshelf 96
- MS Windows® 95/MS IntelliMouse
- 3 Year Limited Warranty† with 1 Year On-site^ Service

$3799

Business Lease∞: $134/Mo
Order Code #500928

NEW DELL DIMENSION XPS D266
266MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

- 32MB SDRAM Memory
- 512KB Integrated L2 Cache
- *NEW* 6.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- *NEW* 1000TX Trinitron® Monitor (15.9" v.i.s., .26dp)
- *NEW* STB Velocity 4MB AGP Video Card*
- 24X Max.§ Variable CD-ROM
- Creative Labs AWE64 Value Sound Card
- Altec Lansing ACS-290 Speakers with Subwoofer
- 56K Capable** U.S.R. x2 WinModem
- Microsoft Office 97 Small Business Edition plus Encarta 97
- MS Windows 95/MS IntelliMouse
- 3 Year Limited Warranty with 1 Year On-site Service

$2799

Business Lease: $101/Mo
Order Code #500927

NEW DELL DIMENSION XPS D233
233MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

- 32MB SDRAM Memory
- 512KB Integrated L2 Cache
- *NEW* 4.3GB Ultra ATA Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card*
- 24X Max.§ Variable CD-ROM
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers
- 56K Capable** U.S.R. x2 WinModem
- Microsoft Office 97 Small Business Edition plus Bookshelf 96
- MS Windows 95/MS IntelliMouse
- 3 Year Limited Warranty with 1 Year On-site Service

$2399

Business Lease: $87/Mo
Order Code #500926

DELL DIMENSION XPS M200s
200MHz PENTIUM® PROCESSOR WITH MMX TECHNOLOGY

- 32MB SDRAM Memory
- 512KB Single Bank Pipeline Burst Cache
- 4.3GB Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- STB Nitro 4MB EDO PCI Video Card
- 24X Max.§ Variable CD-ROM
- Sound Blaster 16 WaveSynth Wavetable Sound
- Altec Lansing ACS-90 Speakers
- 56K Capable** U.S.R. x2 WinModem
- Microsoft Office 97 Small Business Edition plus Bookshelf 96
- MS Windows 95/MS IntelliMouse
- 3 Year Limited Warranty with 1 Year On-site Service

★ *Upgrade to 64MB SDRAM, add $199*

$1999

Business Lease: $72/Mo.
Order Code #500925

"DELL IS THE ONLY COMPANY VOTED TOPS IN BOTH RELIABILITY AND SERVICE CATEGORIES-EARNING A BEST RATING OVERALL." -*PC WORLD*, JUNE '97

In addition to being dependable and affordable, it now appears we're a little predictable too. That's because we've scored Best Overall in Reliability and Service on *PC World*'s survey, yet again. And not only did we beat 12 "industry leaders," but we also scored five perfect stars in eight of nine survey categories. So what does this mean for you? While we'll continue to impress you with our state-of-the-art technology at incredible prices, you can still expect superior quality components in every computer and, if you should ever need it, the same superior response from the Dell service department. So give us a call now for your new computer or visit our Web page. And you'll discover why, after such a stunning blow like this, the competition's seeing stars. Five of them, actually.

As part of PC World's Reliability and Service Survey August 1, 1996 through January 25, 1997

DELL

TO ORDER TOLL-FREE
800-284-1160
TO ORDER ONLINE
www.dell.com/buydell

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT In Canada,† call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04540

MMX intel inside pentium II processor

***Product, as configured, will ship by October 20. Please call for updated shipment information.**

†For a complete copy of our Guarantees or Limited Warranties, please write Dell USA L.P., Attn: Warranty, One Dell Way, Round Rock, TX 78682. ^On-site service provided by an independent third-party provider. May not be available in certain remote areas. **4MB baseboard with a 4MB upgrade module. §24X Max./12X Min. **x2 products are capable of 56Kbps downloads. Due to FCC rules that restrict power output, however, current download speeds are limited to 53Kbps. Upload speeds are limited to 33.6 Kbps. Actual speeds may vary depending on line conditions. •Prices and specifications valid in the U.S. only and subject to change without notice. Intel, the Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. MS, Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. ©1997 Dell Computer Corporation. All rights reserved.

Big enough to fit your vision.

ADI MicroScan

Introducing the new 19" (18" viewable image) ADI MicroScan 6P.

THE NEW MICROSCAN 6P

- 19" (18" viewable image)
- 0.22mm horizontal dot pitch
- 1600 x 1200 @ 75Hz
- Horizontal Frequency 30-95KHz
- USB hub built-in
- Microphone built-in
- Attachable speakers option

The MicroScan 6P delivers the eye-opening benefits of a big screen but costs about the same as smaller monitors. Now you can get a 19" screen (18" viewable image) with the sharpest image clarity available, attachable speakers, built-in microphone, and a USB hub, all in an innovative design that fits neatly on your desk. And your budget. The perfect monitor for viewing one window or many, the MicroScan 6P bridges the gap between tomorrow's visions and today's deskspace and budgets. With our industry-leading guarantee of quality and reliability, ADI registered users enjoy a free 45-month warranty*, 25% longer than our competitors. Call 1-800-977-3336 today, or visit us at www.adiusa.com for the dealer nearest you.

Seeing clearly into the future

ADI

www.adiusa.com

*1997 ADI Systems, Inc. 2115 Ringwood Avenue, San Jose CA 95131. MicroScan is a trademark of ADI Systems, Inc. All other trademarks are properties of their respective owners. Specifications subject to change without notice. * 42 month warranty program registration required.

42 MONTH WARRANTY

USB

CIRCLE 226 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Second Looks

HP OFFICEJET PRO 1150C

The Machine That Could

When we first looked at Hewlett-Packard's OfficeJet Pro 1150C ($900 street; First Looks, April 22, 1997), we loved its multifunction capabilities. You can print, copy, and scan—all from the same affordable unit.

The first day we set up the OfficeJet, we knew it would be a desirable peripheral. What we didn't realize was that the device also has brains, brawn, and stamina.

Many staffers at *PC Magazine* have used the machine for business-related purposes. Some just wanted to have fun with it—making the OfficeJet a true SOHO solution. Folks from our art department use the OfficeJet's 300-dpi scanning capability to help create collages (one is pictured below). Others in the editorial department like to use the scanner to save electronic versions of photos taken on their vacations.

As noted in our initial roundup, the photo-realistic quality of images that were scanned and printed with the OfficeJet was slightly worse than the quality obtained by a straightforward color copy. But the quality of printed output obtained by either method was favorable when compared with the original photo.

The simplicity of the copier's Auto Enlarge feature may make you permanently resist fiddling around with the keypad on any ordinary copier. Just press the Reduce/Enlarge button until you see Auto Enlarge on the LCD panel. Then place any photo (for instance, a driver's license) on the lower-right-hand corner of the scan-bed, close the top, and press Color or Black/White to create a copy that fills the entire page.

If what you really need is a quality printer, the OfficeJet will suit you just fine. Ream after ream of paper was shuffled through the machine and printed all sorts of documents without a hitch.

At 600- by 600-dpi resolution for monochrome and 600 by 300 dpi for color, the unit's output is top-quality. There was little (if any) difference among Econo, Normal, and Best, the three print-quality modes. The product's only variance was output speed, which ranged from 8 pages per minute (ppm) in Econo to 4 ppm in Best for monochrome prints and from 4 ppm in Econo to 1 ppm in Best for color prints.

The cost is about 2 cents per page when printing a sheet with 5 percent monochrome coverage and about 13 cents per page when printing a sheet with 15 percent color coverage. The black-ink cartridge can accommodate about 1,500 pages, and the tricolor cartridge roughly 460 pages. Replacement cartridges are $32.95 each for black and $35.95 for tricolor.

HP has announced the OfficeJet Pro 1150Cse, the same machine at the same cost—with a bonus. Its new software bundle includes MySoftware's MyColorMarketingMaterials, Corel's Print House, and SoftKey's Calendar Creator.—*Tom Ponzo*

HOTMAIL 5.1

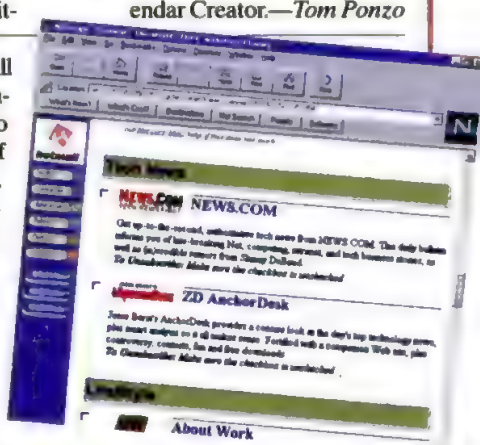
Wear Iron Gloves

For many users, e-mail is at the center of their Internet experience. Hotmail Corp. is attempting to capitalize on this trend by offering several value-added services with its latest update—Hotmail, Version 5.1. In addition to an already chock-full plate of features, as discussed in our latest review of the service (First Looks, September 24, 1996), Hotmail now features WebCourier, which delivers Web-page updates to your mailbox.

WebCourier brings you updates in the form of HTML pages from 16 sites, which include cnet's *News.com*, ParentSoup, *Quote.com*, and *Riddler.com*. You can sign up with the WebCourier service and select which page or pages you'd like to have delivered; additional content providers will be added. The pages are then delivered to your Hotmail mailbox as embedded Web pages.

If you're using Hotmail for its free e-mail, you won't be disappointed. Hotmail's intuitive interface lets you easily send e-mail to anyone. You can include multiple attachments, hyperlinks in your message body, and address notes using nicknames or a personal address book. There's also a built-in spell-checker.

Receiving mail is equally simple. One standout feature is the ability to receive e-mail from up to four POP3 servers, making it possible to sort through all your messages at once instead of one mailbox at a time. You can configure up to ten filters that will automatically sort your incoming mail and send it to appropriate folders or (if you choose) to the trash. And if you have been deluged by junk mail from a specific domain or person, you can use the new Block Mail button to shut out all future mail from that source.



Unlike several other services, Hotmail does not let you send your mail to an outside account, and you can't use an "away" message if you're on vacation or a business trip. In addition, when you sign up you still need to fill out a detailed questionnaire, which has become even more invasive than it was when we first reviewed Hotmail. Now, in addition to your annual income, you'll need to provide the service with a list of your hobbies and interests, your highest level of education, and your year of birth. Still, what's here will delight any mail addict, so if you don't mind telling a bit of your life story to strangers and marketing people, you'll find that Hotmail is one of the best free e-mail services out there.—*Karen J. Bannan*

SECOND LOOKS MAILBOX: Tell Second Looks about your experiences with computer products. Contact Carol Venezia at *cvenezia@zd.com*.

©1997 Hitachi PC Corporation (USA). All rights reserved. "Hitachi VisionBook Pro" and "Mobilized Computing" are trademarks of Hitachi PC Corporation (USA), which may be registered in some jurisdictions. The Intel Inside Logo & Pentium® are registered trademarks and MMX™ is a trademark of Intel Corporation. All other marks are owned by their respective companies. **All x2 products are capable of 56Kbps downloads; however, due to FCC regulations which restrict power output, current download speeds are limited to 53Kbps. *Concurrent use of floppy and CD-ROM drives requires use of external AC adapter. Model shown is 7560 and specs quoted apply to that model. Specifications and availability subject to change without notice.

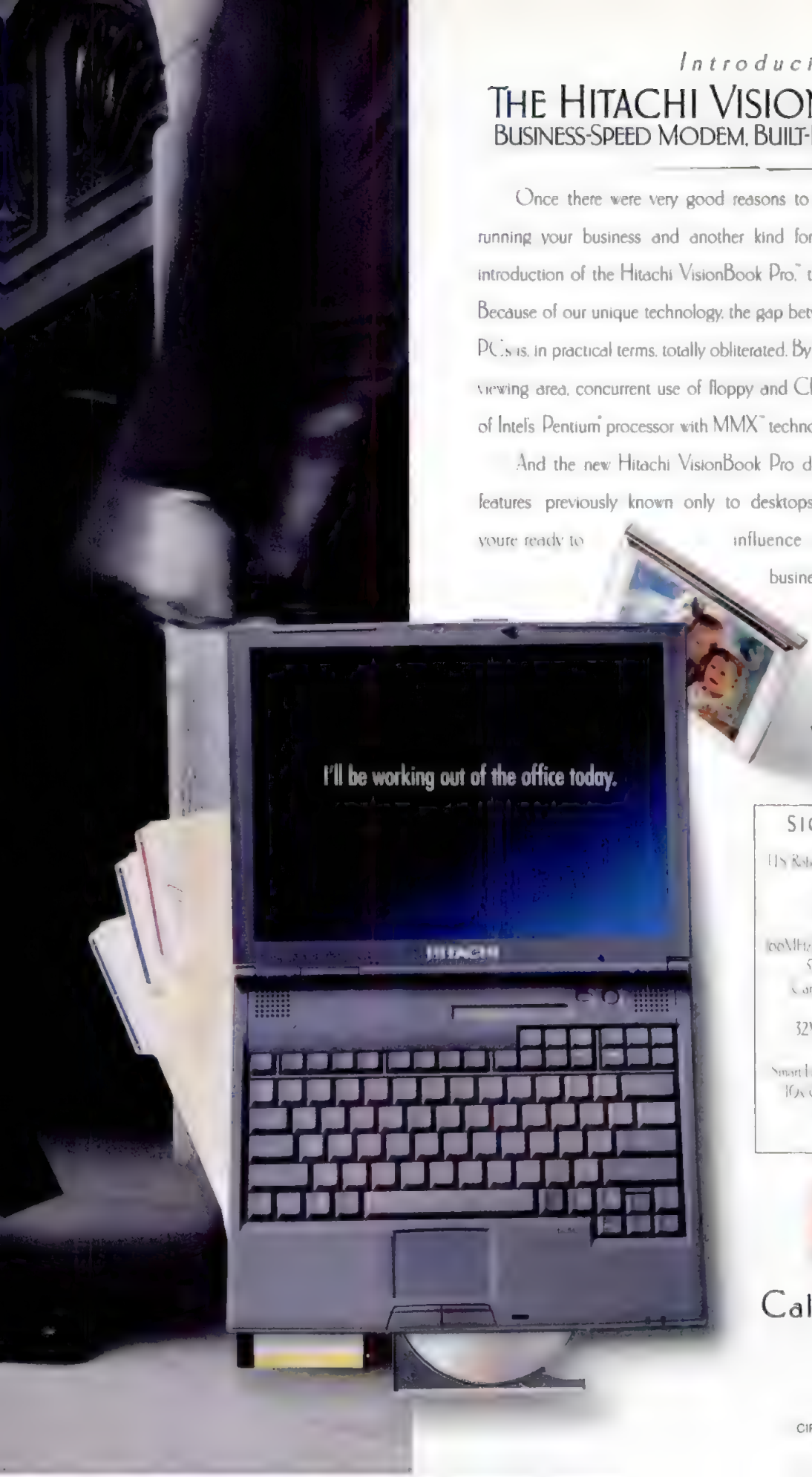
Introducing

THE HITACHI VISIONBOOK PRO.

BUSINESS-SPEED MODEM. BUILT-IN LAN. HUGE SCREEN.

Once there were very good reasons to have one kind of computer for running your business and another kind for running around. But, with the introduction of the Hitachi VisionBook Pro,™ those reasons abruptly disappear. Because of our unique technology, the gap between desktop PCs and notebook PCs is, in practical terms, totally obliterated. By every measure–screen clarity and viewing area, concurrent use of floppy and CD ROM drives*, the performance of Intel's Pentium® processor with MMX™ technology–you compromise nothing.

And the new Hitachi VisionBook Pro delivers integrated communication features previously known only to desktops. With Fax/Modem and LAN, you're ready to influence events from wherever you do business. The Hitachi VisionBook Pro. It will give you your desk back. While eliminating your need for one.



MMX™ intel inside pentium® processor

SIGNIFICANT FEATURES

- U.S. Robotics® 56K™ x2 modem–fastest in a notebook
- Integrated 10BaseT LAN port
- Hitachi super large 13.3" TFT display
- XGA (1024 x 768) resolution
- 166MHz Intel Pentium® processor with MMX™ technology
- 512K L2 cache–twice standard size
- Card Bus compliant Type II/III PC card slots supporting Zoom Video
- 32MB EDO RAM upgradeable to 144MB
- 3.0GB removable hard drive
- Smart Lithium-Ion battery swaps with 3.5" floppy drive
- 10x CD ROM drive swaps with second battery
- Optional advanced port replicator
- Full-size keyboard, USB port

HITACHI MOBILIZED COMPUTING

Call 1-800-HITACHI

www.HitachiPC.com

PCM1007

CIRCLE 143 ON READER SERVICE CARD

NOW YOU CAN

image YOUR hard drive IN A flash!

INTRODUCING **Drive Image.™** THE FASTEST, EASIEST WAY TO IMAGE YOUR HARD DRIVE FOR **backups, upgrades** AND **complete system recovery.**

Buy Now! $15 Cash Back from PowerQuest

When you need an instant copy of your hard drive, Drive Image is the picture-perfect solution. You can easily create and store a compressed image file of your entire hard drive, or just selected partitions, on a JAZ, Zip, network, or second hard drive. That makes backups a breeze, and even a dreaded hard-drive crash is no problem. To restore your system, simply download your drive's image file from its storage source and you're ready to go. Drive Image also makes upgrading to a larger hard drive a snap. Simply copy everything from your old drive to your new drive. You can even specify the size of the partitions on the new drive during copying so everything fits the first time. And Drive Image is fast. Its patent-pending SmartSector™ technology works up to two to three times faster than straight file-by-file or sector-by-sector methods of copying. That saves you time and a lot of aggravation. For more information about Drive Image, visit our Web site at **www.powerquest.com.** Multiple workstation or site licensing options are also available. Call **1-800-379-2566** for details.

Buy Drive Image and get $15 back from PowerQuest. Ask your local reseller for details.

Babbage's Etc. • Best Buy • CDW • CompUSA • Computer City • Egghead • Electronics Boutique • Fry's Future Shop • J&R • Micro Center • Micro Warehouse • PC Connection • Tiger Direct

© 1997 PowerQuest Corporation. All rights reserved. PowerQuest is a registered trademark and Drive Image is a trademark of PowerQuest Corporation. Patents pending

FROM THE MAKERS OF PARTITIONMAGIC®

POWER PQ QUEST

CIRCLE 176 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Speed Kills: The Dial-Up Internet

Bill Howard and I are fortunate indeed. We live within a few miles of each other, and our cable provider has seen fit to install cable modems in our respective towns. We're in bit-rate heaven, while our clueless neighbors are still watching HBO. Bill's column in this issue describes the joys of cable modem speed and the attendant gotchas. Even though the installed base of cable modems is still relatively small, I've focused here on the wrenching changes that it will make on the Web.

First, a few points of order. I see several factors impeding the widespread adoption of cable modems: (1) More than half the cable infrastructure needs to be upgraded before it can be used for cable modems. (2) The cable industry is woefully undercapitalized. (3) High-speed access alone is not enough to make cable modems attractive to a wide audience. (4) Cable will have to compete with high-speed digital subscriber lines (DSLs) offered by the telephone companies. (5) Cable connects to 70 percent of U.S. households, compared with nearly 100 percent of all homes with telephone service.

On the plus side we have these points: (1) Recent cable mergers and consolidations have made the industry more stable, with better financial resources. (2) As cable begins to shed its buccaneer image, Wall Street is slowly waking up to the potential upside in cable-based Internet offerings. (3) Content aggregators, network providers, and service organizations exist to provide Internet smarts to TV-oriented cable operators. (4) The combination of high-speed access and upgraded, fiber-based systems makes cable more competitive with DSS (digital satellite services). (5) Most telephone companies are, if you'll pardon the expression, asleep at the switch.

Cable modem service costs as much or more than the most expensive premium services offered by traditional ISPs, but their blazing speed is worth every penny. Speed is what will change the fundamental nature of the Web, which is characterized today by the "World Wide Wait."

Cable access changes all that. You may hit a slow or busy server, but by and large, text and images load at least as fast as they would from your CD-ROM. Software downloads far more quickly than it would from a floppy disk. Streaming audio is now so well established that you can listen to any kind of "radio" station you could wish for: your favorite music style or station format at FM-radio sound quality with no noticeable effect on Web performance. Streaming video is becoming more prevalent, especially on the news sites. These new, denser media will be the cornerstone of the new Web, whether you call it Internet 2, Web 2000, or whatever, and the only way you'll be able to get multimedia is with a cable modem or a DSL. Life is too short to try to do multimedia at 33.6.

BIT-RATE HEAVEN

Cable modem service is expensive, but the blazing speed is worth every penny.

This idea, however, has not fully permeated the sensibilities of the content providers or the service providers. Most of the real changes in personal computing happen at the grass-roots level—when people decide to adopt a new technology, not when big corporations decide to start selling it. To that end, @Home (*www.home.net*), the backbone service and national content provider that serves our cable operator, Comcast, encourages customers to build their own Web sites and to populate them with streaming multimedia files. Ostensibly, these Web sites, with their high-speed advantage, would give other @Home customers something to enjoy. But then, in the next breath, the FAQ tells you that you're allocated only 5MB for your site. Excuse me, but have you seen how big streaming-video files can get? And where are the tools to build these files? Oh, well, they'll figure it out before long.

While we're at it, where are the multimedia chat rooms, video teleconferencing, and Net phone resources? All of these work best at high bit rates and would give high-speed providers an advantage over the existing Web services. They're just the thing to make consumers want to hang up their AOL accounts for good.

To be fair, @Home is still feeling its way along. As default home sites go, there's a lot of content, but I don't think it's arranged in a compelling way. The staff are dedicated, but they're not yet practicing what they preach with animation, streaming video, and audio. Some of the content partners are deficient, and some of the channels are little more than collections of links. But you'll certainly impress your neighbors with the information—and the speed—at your disposal. PC

PHOTOGRAPHS BY BOB HOLMGREN

Walking away with an NEC Versa has just become easier.

(In more ways than one.)

$2899
New low price for the Versa 2650CDT

For a short time, the company that brought you the first notebook computer, as well as the first notebook available with an active matrix display, is lowering the price on four Versa notebooks. And now is the best time to act, because the first 6000 units sold come with a free carrying case. So call today, because there's never been a better opportunity to take a Versa notebook home with you.

FREE
Carrying case with purchase
(while supplies last)

NEC Versa® Notebooks

Versa 6200MX
The ultimate power notebook

- 13.3" XGA Active Matrix TFT Color Display
- 166MHz Pentium® processor with MMX™ technology
- 32MB RAM (128MB max)
- VersaBay™ II Option Slot for CD-ROM, Floppy Drive (both included), Optional 2nd Hard Drive and 2nd Battery
- 2.1GB Removable Hard Drive/Lithium Ion Battery/10X avg CD-ROM
- 256KB L2 Pipeline Burst Cache
- Full-Screen, Full-Motion MPEG Video
- Integrated 16-bit Stereo Sound and Speakers with 3D Spatializer Technology
- Windows® 95 or Windows for Workgroups 3.11
- 3-Year Limited Warranty and One Year Free UltraCare™ Service with Registration
- Optional Versa MiniDock™ 6000, add $499

$3999

Versa 6050MH
High performance desktop replacement

- 150MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB RAM (80MB max)
- VersaBay II Option Slot for CD-ROM, Floppy Drive (both included), Optional 2nd Hard Drive and 2nd Battery
- 2.1GB Removable Hard Drive/10X avg CD-ROM/ Lithium Ion Battery
- Integrated 33.6Kbps Data/Fax/Voice Modem
- 256KB L2 Pipeline Burst Cache
- Full-Screen, Full-Motion MPEG Video
- Integrated 16-bit Stereo Sound and Speakers
- Windows 95 or Windows for Workgroups 3.11
- 3-Year Limited Warranty and One Year Free UltraCare Service with Registration
- Optional 2nd Lithium Ion Battery, add $199
- Optional Versa Docking Station 6000 Plus, add $899

$3399

Versa 2650CDT
The all-in-one convenient solution

- 150MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB RAM (80MB max)
- 1.44GB Removable Hard Drive
- Built-in 10X avg CD-ROM, Floppy Drive and Lithium Ion Battery
- 33.6Kbps Data/Fax/Modem PC Card with XJACK®
- 256KB L2 Pipeline Burst Cache
- Full-Screen MPEG Video
- Integrated 16-bit Stereo Sound and Speakers
- Windows 95 or Windows for Workgroups 3.11
- 1-Year Limited Warranty and One Year Free UltraCare Service with Registration
- Free Versa PortBar™ 2600 ($149 value) or Free Carrying Case*

$2899

Versa 2530
Customizable to meet your needs

- 133MHz Pentium processor
- 12.1" SVGA Dual Scan Color Display
- 16MB RAM (48MB max)
- 1.44GB Removable Hard Drive
- VersaBay 2500 Slots Accept 1.44MB Floppy Drive, 8X CD-ROM, and NiMH Battery (all included)
- 256KB L2 Pipeline Burst Cache
- Full-Screen MPEG Video
- Integrated 16-bit Stereo Sound and Speakers
- Windows 95 or Windows for Workgroups 3.11
- 1-Year Limited Warranty and One Year Free UltraCare Service with Registration
- Under 7lbs.**

$1799

MMX intel inside pentium® processor

©1997 NEC Computer Systems Division, Packard Bell NEC, Inc. NEC and Versa are registered trademarks; VersaBay, MiniDock and PortBar are trademarks; and UltraCare is a service mark of NEC Corporation, all used under license by Packard Bell NEC, Inc. NEC NOW is a service mark of Packard Bell NEC, Inc. *Carrying case offer good while supplies last. **6.9lbs. with floppy drive and CD-ROM; 7.5lbs. with floppy drive and battery. Prices do not include shipping or applicable sales tax, are valid in the US only and are subject to change without notice. Products and specifications are subject to change without notice. MS, Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. All other trademarks and registered trademarks are property of their respective owners.

BUILT TO ORDER

To order, get a free catalog or find your nearest reseller call:
Mon-Fri 8am-8pm EST

1-888-8-NEC-NOW
Dept. No. PM570A www.necnow.com

NEC

CIRCLE 154 ON READER SERVICE CARD

JOHN C. DVORAK

Clunker-Caliber CPUs

As you read this, Intel should be showing off its new bug-fix feature, secretly incorporated into the Pentium MMX and Pentium II processors. This lets people actually patch the chip if a flaw is found. Intel hopes that this built-in system isn't itself flawed, as some outside observers fear. Worse, this system, as nifty as it is, might be an admission that flawless microprocessors can no longer be made.

With this circuit it's possible to fix some malfunction in the microcode within the chip. In the case of the Pentium II, it's a minor floating-point flaw. This new feature was developed in earnest after Intel dropped a stupendous $475 million after a 1994 recall of the first Pentiums due to the discovery of a FDIV floating-point-division bug. This is more than pocket change, even to Intel. The new bug in the Pentium II, known as the "Dan-0411 flag erratum," apparently is fixable without a recall.

Another thing leading to this new concept in chip design is what *EE Times* described as a "verification crisis." With the transistor count increasing dramatically in the next few years, there is no way to test these devices adequately except over time in the real world. Thus this new process for fixing problems comes after the fact.

Two questions remain. First, many engineers wonder why Intel didn't announce immediately that this technology was available and would be used to fix the Dan-0411 flag erratum bug. I suspect Intel wasn't absolutely sure that this fix-on-the-fly system would work on this bug and didn't want to look even more foolish if for some reason the bug was not fixable with this "great new technology."

The second issue that has been raised by other engineers: What happens if someone hacks the system and loads the processor with faulty code designed to screw up the chip operations forever? Supposedly this is not possible because Intel has the system so encrypted that unless everything matches deep knowledge of the encryption, the microcode cannot be tampered with. As we all know, fail-safe encryption schemes have a way of being broken.

The biggest issue on my mind is the sad fact that very few products are shipped bug-free nowadays—and it's getting worse. Ask anyone who reviews software for a living how many times the following scenario has happened: You're told that the greatest piece of software is currently in beta. A big hoopla is made over the product. You get it by FedEx on Monday. On Tuesday you get a desperate call from the vendor saying a horrible bug has been found, and on Wednesday or Thursday you get a replacement disk. This happens all the time. With more complex operating-system software, the bug fixing never ends.

SOUR LEMONS

The biggest issue on my mind is the sad fact that few products are shipped bug-free nowadays.

In my mind it seems to be miraculous that something like the Pentium II can have only one open flaw and that it's fixable. This is not the case with most software, which tends to be loaded with bugs that are seldom fixed. Other products, such as flaky modems or cell phones that connect you to someone else's phone call, or keyboards that die, or any number of consumer electronic products, are mostly beyond repair.

In fact, we're in the midst of a quality crisis. It will be a matter of time before this finally gets to Intel and all the other semiconductor companies that struggle to compress more functionality into smaller packages. Their winning streak is excessive, especially compared with what we see from all the other sectors of society.

Mad cow disease, *E. coli*, and other toxins in the food chain are the tip of a quality-crisis iceberg. This is the food chain we're talking about! You'd think quality would be a prime concern. In some municipalities you are advised not to drink the water. It's as if we live in a third-world country. Flawed products from the manufacturing sector—such as the "lemon" auto, which actually required a "lemon" law to be implemented in California and elsewhere—are an epidemic.

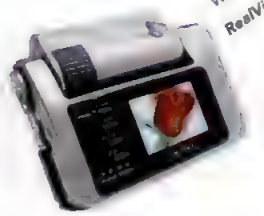
Exactly how the semiconductor industry has managed to bring us so much computing power to the desktop without stalling under the cloud of the quality crises that haunt manufacturing mystifies me. Especially since the software industry is a business of one bug fix after another.

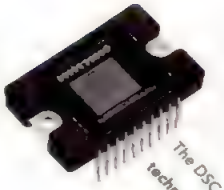
Personally I suspect that this new fix-on-the-fly technology is an admission that things that once went smoothly will not be as tranquil in the years ahead. It's a realization that we're at the end of the paved road in desktop computing and heading toward gravel. Caution: Bumps ahead.

Create a world where superior technology and creativity collide.

Because You Can.

When it's not busy helping you get the perfect shot every time, the DSC-F1's RealView™ LCD screen lets you instantly view or delete any shot you've taken.

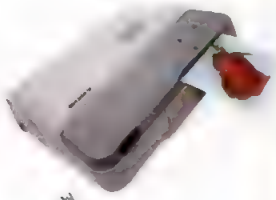




The DSC-F1 uses Sony's unique Progressive Scan, Square Pixel CCD technology, translating into outstanding image quality time after time.

The **Sony DSC-F1 Digital Still Camera** is small on size, but big on innovation. Storing up to 108 images at 640 x 480 resolution, it also features a 180° rotating head, built-in flash, as well as a rechargeable Lithium Ion battery.

And that's just the beginning



Looking for an opinion that's a little more impartial than ours? Then check out all the awards (14 and counting) the DSC-F1 has racked up from experts throughout the industry.

Using the DSC-F1's infrared technology, instantly print out your favorite shots without wires by beaming them directly into Sony's **DPP-M55 Photo Printer** (no PC required). Or, wirelessly transfer them straight into your PC* or notebook

For more information: 1-800-352-7669 or www.sony.com/image

How different would your work be if you only had the tools to match your own talent? Find out with the Sony DSC-F1 Digital Still Camera.

VAIO

The DSC-F1 fits in your pocket, so it goes anywhere you do. Yet it's packed with features like wireless capabilities, RealView color LCD screen and macro mode for close-up shots. No wonder the DSC-F1 has won awards and praise from experts near and far. Just aim, shoot and store up to 108 pictures, then manipulate them on your PC using included PhotoStudio™ image editing software. Next, crank out a few hard copies with Sony's color photo printer, or add the images to a website or presentation. Of course, you can also let the boss behold your creativity on the big screen TV using the DSC-F1's video output.

With so many options, your workplace will never be the same. More importantly, neither will your work.

SONY

© Sony Electronics Inc. All rights reserved. Reproduction in whole or part without written permission is prohibited. Sony, the Sony logo and RealView are trademarks of Sony. Screen image is simulated. PhotoStudio is a trademark of ArcSoft, Inc. *Supports Microsoft Windows® 98 USB Device Driver version 2.1 included—USB adapter for computer required if USB is

JOHN C. DVORAK

Inside Track

The **plot thickens at Apple** as new (old) chairman Steve Jobs installs a bunch of his pals on the Apple board of directors and cozies up to Bill Gates, much to the dismay of Apple diehards. Gates and Jobs have no love lost for each other, but Jobs needs Microsoft's help to get Apple on track. Apple needs apps for the Mac and may even need a license for Windows 95 at some point.

The way this is **unraveling** may benefit Bill, too. The last threat to Microsoft's world domination is the licensing of the Mac OS to the rest of the world. Jobs has been bellowing about **stopping the licensing of the Mac OS** to the point where employees of Boston-based Power Computing—the top Mac cloner—picketed the Steve Jobs announcement.

In my view, it's possible for one of two things to happen. Apple may roll out a Windows 95 machine to compete directly with PC makers. Or Microsoft may buy Apple. Why buy a cow if the milk is free?

Power Computing is long past the point where it was making **cheaper and faster machines** than Apple. The company was seriously cutting into Apple sales, and I suspect that Jobs, who **disliked** this situation, told Bill that he'd kill OS licensing if Gates would get on board. Gates had nothing to lose. So Microsoft is firmly back in the Mac camp and has promised to float Apple $150 million in good-faith money. Of course if Jobs were really against all the perceived **bonehead** decisions Apple has made while he was away, then surely Apple's dopey purchase of NeXT Software and most of the company for $450 million would be high on the list. Perhaps Jobs should show good faith—reverse the deal and give Bill back the $150 million. Just an idea.

Under their agreement, Microsoft and Apple will do a complete cross-licensing of all current technology and any that is developed over the next five years. This is another situation that won't sit well with Intel, since it still feels that the PowerPC chip has market potential.

It's hard to say at this point who wins and who loses in this deal. There is **seldom a win-win** arrangement with Microsoft if you look at the path that led to its success. As part of the deal, Internet Explorer will be the default Web browser on the Mac, and Microsoft will make sure that a **full-blown version of Office 98** is ported to the Mac. In my view, it's possible for one of two things to happen. Apple may roll out a **Windows 95 machine** to compete directly with PC makers. The other possibility is that **Microsoft will buy Apple.** But now that it has a cross-license for all the Apple technology, it may not have to. Why buy a cow if milk is free?

From my perspective—and I've long followed the Mac story—it's also possible (although Mac nutballs would never admit this) that **Apple will get more from Microsoft** than Microsoft gets from Apple. Jobs may be chuckling to himself over this deal.

Genuinely Interesting Hardware Dept.: I've always been a fan of the Taiwan modem company Zyxel. It has outstanding circuit designs and seldom rushes a product to market. If you have ISDN and are looking for **great price/performance,** check out the latest terminal adapters from these guys. Essentially they've cloned Motorola Bitsurfer and Ascend Pipeline at a substantially lower price. Over the years, **Ascend had been the undisputed leader** in ISDN technology for the end user, but now everyone is getting into the act. Contact Zyxel at 714-693-0808 for more information or surf over to its Web site at *www.zyxel.com/html/prodguide/routers.html#p100.* Zyxel's Omni.net "modem" is about $250, and its high-end router is around $700. Excellent-o!

Tip of the Month Dept.: If you use a digital camera, you may want to reconsider your choice of batteries. I was consistently **mystified** that my rechargeable nickel cadmiums would give me three times as many photos on a Kodak DC-50 as alkalines, which died shortly after 40 or 50 pictures. A battery engineer explained that a digital camera needs amps **fast** to charge the CCD and that alkalines are not designed to do this well because their internal resistance is much higher than that of nickel cadmiums. Thus the nickel cadmiums can last almost three times as long in digital cameras as alkalines. But the clear winner in this battle is the Energizer AA "high-energy" lithium battery. I had some loaded in a Kodak DC-120 when I went to China recently and **shot about 600 pictures** before the batteries gave. This included a lot of flash shots. Afterward, the batteries powered a flashlight for about ten times as long as an alkaline. You can do the math on the cost-effectiveness of each battery. Just avoid alkalines!

Genuinely Interesting Software Dept.: I have been meaning to plug this unique product for about a year, and I'm sure the vendor thinks **I'm a goofball** for not doing it sooner. It's called Wind Chimes. If you like the idea of random background noise modeled after wind chimes, then this product is for you. This is no simple system, either. It creates a fantastic mood. It's **deep with cool features.** Astonishing, actually. I wish I could adequately describe how terrific this program is. It's also perfect for driving people in the office crazy! **Just buy it.** It's only $20 and part of a group of excellent sound products from Syntrillium Software. Call 602-941-4327 to get a copy of Wind Chimes or check out its Web page at *www.syntrillium.com* to examine its outstanding $50 digital-audio editor, Cool Edit. **All highly recommended.** PC

At ProGen, competitive-edge pricing meets on-the-edge performance.

We at ProGen Systems have built our success on what we call the partnership of performance and price. It's a way of doing business that works for us. And it works for you, too.

That's because we build-in the latest industry advances, including genuine **233MHz Intel Pentium® Processors** with **MMX™** technology, **3D MPEG** video graphic acceleration, a **Subwoofer Sound System** and the new **24X CD-ROM** drives, and offer them to you at highly competitive prices.

Backed by the ProGen ProCare **3-year limited warranty, free tech support and on-site service**, our systems offer unsurpassed performance, reliability and value.

Whether you're looking for a business professional, corporate or multimedia solution, ProGen has the system for you at a price that works for your budget. So call a ProGen consultant today, or visit our **on-line order** web site at **www.progen.com**, and put ProGen to work for you.

MMX intel inside pentium II

Polaris Featuring Intel Pentium® II Processor

Common features: 512KB Integrated L2 Cache, **NEW 24X EIDE CD-ROM Drive**, PCI 32 bit 3D Stereo Wavetable Audio Subsystem, MS Mouse, Win95 KB, 1.44MB FDD, 2 Universal Serial Bus (USB) Ports, Super CD Bonus Pak, Microphone w/ Stand, ProGen ProCare Warranty: 3-Year Limited Parts + 1-Year On-Site

233MHz Pentium® II Processor

- Intel 440LX AGP Chipset
- 32MB EDO DRAM
- 4.3GB EIDE Hard Drive
- Panasonic 15" (14" v.i.s.) .27dp Digital PnP Monitor
- AGP Video Graphic Card, 4MB VRAM, upgradeable to 8MB VRAM
- **56K Ready Telephony Modem**
- Amplified Stereo Speakers
- MS Windows NT Workstation v.4.0

$2189

266MHz Pentium® II Processor

- Intel 440LX AGP Chipset
- 32MB EDO DRAM
- 5.1GB Fast EIDE Hard Drive
- ProGen 17" .28dp Digital PnP Monitor
- 33.6K Telephony Modem
- AGP Video Graphic Card, 8MB VRAM
- Subwoofer Sound System w/Amplified Stereo Speakers
- MS Windows 95

$2569

266MHz Pentium® II Processor

- Intel 440PX PCI Chipset
- 64MB EDO DRAM
- **NEW 6.4GB EIDE Hard Drive**
- Panasonic 17" (16" v.i.s.) .27dp Digital PnP Monitor
- Iomega Zip 100MB IDE Internal Drive w/One Cartridge
- Diamond Stealth 3D 4MB VRAM Video Graphic Card
- **56K Ready Telephony Modem**
- Subwoofer Sound System w/Amplified Stereo Speakers
- MS Windows NT Workstation v.4.0

$2649

Discover 3D

Intel 200MHz Pentium® Processor with MMX™ Technology

- 512K Pipelined Burst Cache
- ProGen 15" 28dp Digital PnP Monitor
- **ProGen GOLD 3D (S3 Virge) 4MB EDO DRAM, MPEG**
- 16X EIDE CD-ROM Drive
- 33 6K Telephony Modem
- 3D Stereo Wavetable Audio Subsystem, complete with Amplified Stereo Speakers
- MS Windows 95/Hi-Res Mouse
- 1.44MB FDD/Win95 KB
- Home Office Suite 97, Infopedia Educational CD and 3 Exciting Games Pak, Microphone w/ Stand
- ProGen ProCare Warranty (3 Year Limited Parts & 1 Year On-site)

166MHz Pentium® Processor w/MMX™ Technology — **$1049**
16MB EDO DRAM, 2.5GB Fast EIDE HDD

200MHz Pentium® Processor w/MMX™ Technology — **$1219**
32MB EDO DRAM, 3.2GB Fast EIDE HDD

233MHz Pentium® Processor w/MMX™ Technology — **$1399**
32MB EDO DRAM, 4.3GB Fast EIDE HDD

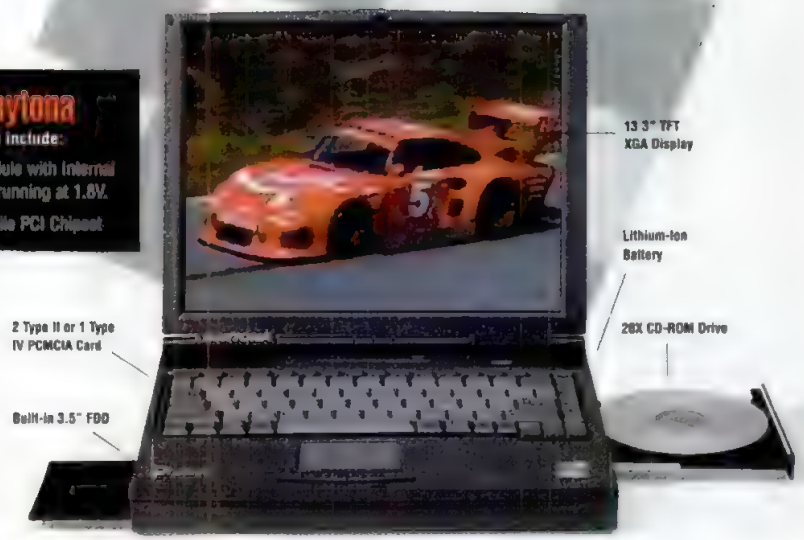
*Add a Desktop Camera, video capture, motion video, for $199.

Introducing the powerful new ProGen Daytona™ series of Notebook Computers, featuring the Genuine Intel Mobile Module.

The ProGen Daytona series takes the lead on the notebook price/performance track with the power of the latest Intel 200MHz and 233MHz Pentium® Processor with MMX™ Technology. These state-of-the-art systems take their competitive edge even further with the genuine Intel Mobile Module and internal 512K L2 Cache, running at 1.8V.

By using the **Intel Mobile Module**, ProGen Daytona notebook computers enjoy a definite advantage over other notebook computers built around lower-cost desktop CPUs, which can significantly increase power consumption, reduce battery life and slow performance by as much as 50%!

ProGen Daytona
Standard features include:
- Intel Mobile Module with Internal 512K L2 Cache, running at 1.8V.
- Intel 430TX Mobile PCI Chipset



ProGen Daytona™ Series

Standard features:
- 13.3" TFT Active Matrix XGA Display
- Intel Mobile Module with Internal 512K L2 Cache Running at 1.8V
- Intel 430TX Mobile PCI Chipset
- PCI Bus with 64-bit Graphic Accelerator, 4MB SGRAM
- 20X CD-ROM Drive
- ALPS Touch Pad Pointing Device
- 16-bit SoundBlaster Pro Compatible Stereo sound (supports 3D sound and wavetable)
- Built-in Stereo Speakers and Microphone
- Infrared Module (including Utility) Supports FIR
- CardBus and Zoomed Video Ready
- S-video and NTSC-video
- Built-in 3.5" FDD, 2 Type II or 1 Type III PCMCIA Slot
- Lithium-Ion Battery/AC Adapter
- Mobile Car Adapter
- Carrying Case
- Microsoft Windows 95
- 1 Year Limited Parts and Labor Warranty

200Mhz Intel Pentium® Processor w/MMX™ Technology, 1.8V

- 512K Internal L2 Cache, 2.1GB HDD, 16MB EDO DRAM, PCMCIA 33.6K bps Fax/Modem — $3649
- 512K Internal L2 Cache, 2.1GB HDD, 32MB EDO DRAM, PCMCIA 10BaseT Ethernet Card — $3749
- 512K Internal L2 Cache, 3GB HDD, 32MB EDO DRAM, 56K bps PCMCIA Fax/Modem — $3649

233Mhz Intel Pentium® Processor w/MMX™ Technology, 1.8V

- 512K Internal L2 Cache, 3GB HDD, 32MB EDO DRAM, PCMCIA 33.6K bps Fax/Modem and Ethernet 10BaseT Combo Card — $4249
- 512K Internal L2 Cache, 3GB HDD, 64MB EDO DRAM, PCMCIA 56K bps Internal Fax/Modem — $4399

Daytona Upgrade Options

- Port Replicator — $ 59
- Additional Lithium-Ion Battery (with system purchase) — $200
- Call for various carrying cases

MMX intel inside pentium® PROCESSOR

1-800-848-1353

Sales Hours: M-F, 6:30 A.M. - 7:00 P.M. PST • Sat., 8:00 A.M. - 3:00 P.M. PST
Technical Support: 1-888-777-5501 • Customer Service: 1-800-848-8787
Customer Service/Technical Support Hours: M-F, 8:00 A.M. - 8:00 P.M. PST

ProGen™ Technology Inc. 15501 Redhill Avenue, Tustin, CA 92780 Ph: 714/566-9200 Fax: 714/566-9267
BBS: 714/566-9255 E-Mail: webmaster@progen.com.

©1997 ProGen™ Technology Inc. Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. All other trademarks are the property of their respective owners. Prices are subject to change without notice. * On site service is based on the discretion of ProGen technical support. Leasing Rate will vary depending on state legislation, and is intended for business or corporate use only. 30-day money-back Guarantee (shipping cost not included). Actual products may be different from products in photo.

CIRCLE 287 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

ProGen™ SYSTEMS
Works for You.
www.progen.com

Vivid Imagination

Once again, Acer sets higher standards in performance, quality and value with the introduction of a new family of AcerView monitors designed to maximize your viewing experience. ***Revolutionary Mini-Neck CRT Tubes*** in selected models offer ***Power Consumption Reductions Up to 46-Percent***, while Intelligent iScreen™* design makes customizing your favorite settings a snap. ***With Sizes Up to 17" (15.7" viewable)***, ***Optional Attached Speakers*** and ***Dot Pitch Ranges from .28 to .25***, AcerView has the perfect flicker-free model just for you. Backed by Acer's 3-year limited warranty and outstanding reputation for reliability, they're all ***Windows® 95 Plug'n Play Compatible***. Call ***1-800-379-2237, Ext. 123*** today for the dealer nearest you to see the new monitors from AcerView that display images so vividly, you'll question reality.

Acer®

AcerView™ Quality Monitors

CIRCLE 087 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

©Copyright 1997 Acer Components, a division of Acer America Corporation. All rights reserved. *iScreen not available with 35c or 55c models.
The Acer Components logo and AcerView are trademarks and iScreen is a registered trademark of Acer America Corporation and Acer Inc. Windows is a registered trademark of Microsoft Corporation. All other trademarks are the property of their respective owners. Vivid.PCM.6/97 123

JIM SEYMOUR

Microsoft/Apple: A Win-Win Deal

"We have to let go of a few notions here." When Steve Jobs told a crowded audience at MacWorld in Boston a few weeks ago about the deal he'd struck with Bill Gates for a Microsoft investment of $150 million in Apple, he used those words to try to calm what he knew would be a contentious response.

Apple fanatics have long seen success for their computer and their cause in zero-sum terms. For Apple to win, Microsoft had to lose. Lose what? It didn't matter—market share, respect, awards, face—anything.

These were, of course, the same people who were buying Microsoft applications for their beloved Macs hand over fist, creating Microsoft's enormously profitable position as the dominant supplier of Mac software. Sure, the *very* hard-case Mac-lovers/Microsoft-haters found alternatives, such as Nisus Writer instead of Word. And there was the long love affair between the Mac community and Wingz, the spreadsheet that almost was. But in general, Mac lovers bought Microsoft apps, cursing the demons of Redmond while simultaneously making them rich.

The very nature of the Mac and of Steve the First's initial positioning of it more than a decade ago—as a cuddly thing, a statement of personal style, "the computer for the rest of us"—encouraged this kind of zero-sum myopia.

But Steve II saw, to his credit, that those days were over. It wasn't a case of Apple versus Microsoft, with Apple winning. Microsoft had already won—big, and Apple had lost—big. And there's not another market extant that shows as well as the PC business how irrelevant zero-sum thinking has become: Successful companies expand the entire marketplace, not just their own revenues.

ZERO-SUM NO MORE

Microsoft's investment in Apple shows that things are not always what they seem.

At the same time, Microsoft's surprising investment in an apparently collapsing Apple is a classic reminder that things are not always what they seem.

Apple's gains and potential losses are obvious. On the upside, there's cash in the till at a critical moment and, much more important, the apparent validation of a sizeable investment from a savvy industry leader. Both will help Steve II rebuild the board and management at Apple, rebuild at least temporarily the company's market credibility, rebuild hope in Cupertino. For a company of Apple's size, $150 million won't last long, but appearances are much more precious than reality here. Downside? Unhappy Mac zealots—but they'll stay on board, not least because the only alternative is the dreaded Wintel.

For Microsoft? The rewards are less obvious—or rather, the obvious rewards are the less important ones. I count five returns on the $150 million for Gates and Microsoft.

First, Microsoft bought market share for Internet Explorer, and at a critical juncture. *PC Magazine* editor-in-chief Michael J. Miller calculates the price at about $40 per Mac user, assuming an active Mac user base of around 4 million. That's a good number, and a bargain for Microsoft. As browsers "turn 4.0," so to speak, Microsoft has to accelerate its apparent gains vis à vis Netscape. Internet Explorer has already been doing well, steadily nibbling market share from Navigator. I estimate that when you include all the copies of IE in use in corporations, Internet Explorer now has nearly a 50 percent market share, up from just 15 percent a year and a half ago. Buying another few million users in the Apple camp will help a lot. (Of course, not every present Mac owner will convert to IE; the doctrinal fog lies heavy upon Macland. But just by shipping IE with new Macs over the next couple of years, Microsoft will gain significant market share—much as Windows 98 is a guaranteed hit, if only because it will be preinstalled on all those new PCs sold next year.)

Second, Microsoft bought some cheap insurance in Washington. Microsoft and the Justice Department are joined in a permanent state of investigation and imminent action over antitrust issues. Investing $150 million in a failing competitor—even if that competitor is noncompetitive and unlikely to reverse that status—buys some lookin'-good credits in Washington. (This, of course, also explains why Microsoft didn't demand—or accept—an Apple board seat for its investment: appearances, appearances.)

Third, Microsoft propped up the market for Mac apps—where, as I said, this company is already the dominant player. It's not hard to imagine Microsoft earning out this putative advance against Mac Office sales in just a couple of years.

Fourth, Microsoft took a big step towards neutralizing a high-profile player in the Java Wars. Apple had been

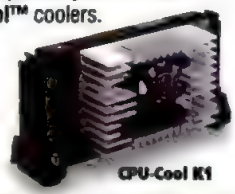
BEWARE OF THOSE WEARING BEARINGS!

Our CPU coolers last 10X longer than cheap imitations!

- Thick, kludgy design
- Sleeve-bearing fan (10,000 hrs.)
- Made in Taiwan
- Thin, integrated design
- Ball-bearing fan (100,000 hrs.)
- Made in USA (5-year warranty)

When you consider the likelihood of premature failure, cheap CPU coolers are no bargain. As their thin-film fan-bearing lubricant dries up, you're left with an irritating noise, higher CPU temperature, and the cost and hassle of replacement. So, protect your 486 and Pentium processors the right way! Use only genuine **CPU-Cool™** coolers.

CPU-Cool 1.9T (486s & 75-133 Pentiums).....$21
CPU-Cool 1.9W (150-200 Pentiums).....$22
CPU-Cool 2.3W (AMD-K6, Cyrix 6X).....$24
CPU-Cool K1 (Pentium II).....(NEW!).....$25
CPU-Cool 3.2 (P6).....$25
Dual CPU-Cool (P6, Fault-Tolerant).....$39



12th Year **PC POWER & COOLING, INC.** 1985-1997

5995 Avenida Encinas, Carlsbad, CA 92008, (760) 931-5700, (800) 722-6555, Fax (760) 931-6988

Web: http://www.pcpowercooling.com Hours: 7 a.m. - 6 p.m. (PT) Mon.-Fri. We accept Visa, MC, COD, or PO on approved credit.

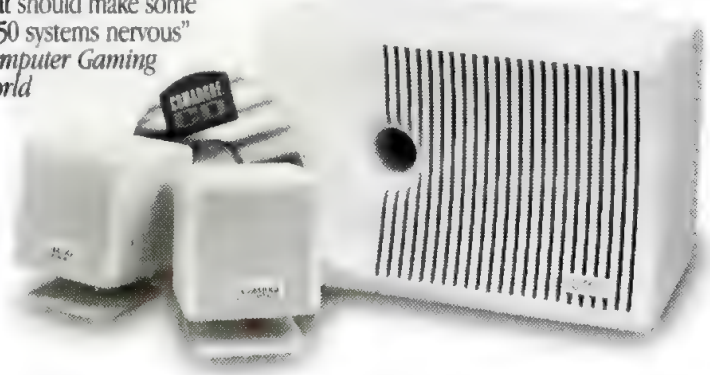
CPU-Cool and Dual CPU-Cool are trademarks of PC Power & Cooling, Inc. Pentium is a registered trademark of Intel Corp. © 1997 PC Power & Cooling, Inc.

CIRCLE 080 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Great Sound. No Risk. $99.99

Introductory Price

"A speaker system for $100 that should make some $250 systems nervous" *Computer Gaming World*



PC Works Speaker System by Henry Kloss.

PC Works' is our newest amplified multimedia speaker system designed by Audio Hall of Fame member Henry Kloss (founder of AR, KLH & Advent). Just connect it to a computer, TV, Tape/CD player or boom box – anything with a headphone jack – for beautiful, room-filling realistic stereo sound. And if you're not perfectly happy with *PC Works*, return it within 30 days for a full refund.

CIRCLE 009 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

To Order, Or For A FREE Catalog, Call 1-800-FOR-HIFI

CAMBRIDGE® SOUNDWORKS

Critically Acclaimed. Factory-Direct.

311 Needham St., Newton, MA 02164 Fax: 617-332-9229 www@hifi.com

PC Works is a trademark of Cambridge SoundWorks, Inc

JIM SEYMOUR

cozy with the Sun/Oracle crowd but now can reasonably be expected to do fewer "Java *Si*, Microsoft *No*!" things over the next few years.

Finally, Microsoft might even earn a profit on its $150 million, if Apple comes back. Compaq, Adobe, even Apple itself have often done well over the years with their investments in other technology companies. Maybe Apple will double the value of Microsoft's investment, and Bill can sell those shares at a profit.

But none of that matters.

This wasn't an investment in any conventional sense, and measuring Microsoft's return on it by conventional measures makes no sense. Microsoft has already got its $150 million worth; the rest is pure gravy.

Microsoft's potential downside? It's hard to find one.

It's worth noting here that just as Mac owners have to grow up regarding Microsoft, Windows, and PCs in general, we need to let go of a few notions on our side of the field as well. Hard times at Apple are not a happy event for Windows users; we need a viable second standard, if only as a goad to Microsoft and a yardstick against which to measure the progress of Windows systems.

Hot stuff: In the DOS era, keyboard macro programs were a major subcategory of PC utilities. Not so under Windows: It's as if we've forgotten how useful they can be. And programmers didn't find writing them much fun, so we've seen very few.

Keyboard Express ends that drought.

It's quick, simple, powerful. You can attach text strings to a bewildering range of keystroke combinations—indeed, one of the tricks is to avoid using a Ctrl-something or Shift-Alt-something combination that one of your primary applications already uses. A "cheat sheet" showing your macros is available with a Ctrl+ <right-mouse-button click>, in case you forget whether it's Ctrl-Alt-M or Shift-Ctrl-F3 that you need.

I use Keyboard Express for inserting return addresses, for inserting frequently used and obscure e-mail addresses without a tedious trip to my e-mail client's address book, for adding copyright notices and disclaimer text, and for dozens of other repetitive-text functions.

Now in Version 2.01c, Keyboard Express comes in both 16- and 32-bit versions and works fine with Windows NT. It's a bargain at $27.95, from Insight Software (801-295-1890); you can download an evaluation copy from ZDNet .com's Software Library or from Insight's Web site at *www.smartcode.com/iss*.

BILL HOWARD

The Cable Modem Guy

Would you pay $10 or $20 more a month to increase the speed of your Internet access a hundredfold? For me, this question is a no-brainer, and it should be for you, too. The answer is cable modem service. If your local cable TV company offers it, sign up. Today.

Imagine taking six months to cross the country by covered wagon, then making the return trip by jet. That's what cable modem feels like compared with traditional modem access.

Cable modem service comes, of course, from the cable TV company. This is not WebTV: the slow-moving, slow-selling modem-based box that sits on top of the TV. Cable modem service travels over the same wire as your cable TV signal, splits out at the service-entrance box on the outside of your house, connects via RG-6 cable to a modem-size box next to your PC, and then travels through twisted-pair wire to a dedicated Ethernet card inside your PC.

What's it like? Fantastic! There's no 60- to 90-second lag while an analog modem dials up and logs on. There's no half-minute delay to load Web pages: Many load in less than a second. Among all the ways to link to the Internet, only a cable modem delivers the "transparency" that fulfills the promise of Internet-enabled software. For instance, if you need a piece of clip art, downloading it from the Web should be no slower than downloading it from your hard disk or CD-ROM drive. I've seen file downloads as fast as 6 Mbps (megabits per second). Even if you use a T1 line (1.5 Mbps) to access the Internet from the office, you'll find a cable modem noticeably faster.

There are quite a few gotchas to cable modems, but even in their totality the gotchas don't come close to outweighing the incredible speed advantages. The most significant gotcha is that cable modem service is available in only a handful of communities. Assuming you can get the service, you need a free slot in your PC for the network card, which can't double as a network card on the off chance that you're running a home network. Your cable company's rules may forbid you to use a cable modem on a LAN-equipped PC, although (wink, wink) most companies acknowledge that there are workarounds. If you are or ever were running a home LAN, be *very careful* that you don't have file sharing turned on; otherwise you're potentially allowing access to anyone on the Internet who can figure out your IP address. If you change PCs, you'll probably have to call the cable company to perform the cable modem swap.

The service typically costs about $30 a month, plus $10 a month to rent the cable modem (which sells for several hundred dollars, so you don't want to buy one yet), compared with $20 a month for most analog-modem Internet service providers. That's the fee if you have cable TV service; if you don't, the monthly fee goes up by almost the same amount as the cost of basic cable TV service. You get an Internet browser loaded for you, an e-mail account, and often a couple of megabytes for a personal Web site. The cable company usually has a regional home page with local news, restaurant listings, and ads.

DAWN OF A NEW ERA

Even if you use a T1 line from the office, you'll find a cable modem noticeably faster.

The 10-Mbps theoretical bandwidth (5 Mbps to 6 Mbps practical) is for the data you download. Uploads are 768 Kbps, which is slower but not slow. All this is shared bandwidth, meaning that's the speed you might get when no one else is pulling down data at the same time as you. If 20 other users on your node (a group of several hundred cable subscribers in your neighborhood) are logged on, you'd get the full bandwidth if the other 19 were reading what's on-screen; you'd get, at best, 1/20 the total bandwidth if all users performed simultaneous page requests. It will be interesting to see how many users per node and how much total system bandwidth the cable operators allocate.

Compared with other forms of Internet access, cable modem performance makes clear that the discussion of 33.6-Kbps versus 56-Kbps POTS (plain old telephone service) modem performance is much ado about relatively little. ISDN modem service may cost you as much as cable modem service for two 64-Kbps ISDN channels, and it's a metered service. Internet DSS is intriguing because it promises up to 400-Kbps speeds, but you still need an analog modem for the page requests.

I hate the term *paradigm shift*, but that's what cable modems represent: They make you think about having computing devices in many rooms of the house. Why not have an information appliance that's a recipe database, phone directory, telephone, Web browser, and movie-listing finder? Now you're cooking. PC

EIZO
PRODUCED BY NANAO

So it wasn't a surprise that an EIZO monitor — which, by the way, is pronounced A-ZO — was picked as a *PC Magazine's* Editors' Choice in 1996, that is, the FlexScan® TX-C7S which boasts a showy 0.25mm pitch Trinitron® aperture grille tube firing up a high refresh rate of 1280 x 1024 pixels of your latest efforts across every square millimeter of the beaming flat square surface of this eye-pleasing TCO 95 as well as ISO 9241-3 certified beauty, while equipping you with edgy performance ideas like Dynamic Focus Circuitry delivering razor sharp focus and cracker crisp corner to corner resolution, not to mention the conveniently built-in DDC circuitry that's so completely compatible with Windows 95 Plug & Play and Windows NT 4.0, and which is not meant to slight the remarkably cost-conscious and conservation-minded PowerManager™ feature or the consistency-enhancing Distortion Elimination Circuit that, obviously, has something to do with eliminating distortion which it does and which is no distortion at all but rather a complete and total statement of fact that helps EIZO win over 65 major performance awards in such a highly competitive marketplace.

Whew, we said they were loaded. But, did we say that
EIZO is the universal brand name
of Nanao? Or that you can reach us at 800-800-5202
or on the web at www.eizo.com? Well, now we have.

AS YOU CAN SEE,
EVERY AWARD WINNING EIZO MONITOR
COMES FULLY LOADED.

EIZO Nanao Technologies Inc., 5710 Warland Drive, Cypress, CA 90630, Phone: 800-800-5202, Fax: 562-431-4811. ©1997 EIZO Nanao Technologies Inc.

NETWORK EDITION

INTERNET SECURITY SOLUTIONS

Security Solidarity

With the proliferation of firewalls, major infrastructure vendors are joining the security fray with their own.

ILLUSTRATION BY DENNIS HARMS

By Padraic Boyle

In this world of product consolidation, infrastructure vendors such as Ascend and Cisco are jumping on the security bandwagon, introducing firewall solutions either as add-ons to their routers and remote-access servers or as separate products. Firewalls, once an expensive specialty service for large corporations, are now becoming as common as—well, routers.

These new all-in-one boxes, or upgrades to existing routers, provide you with many benefits. First off, you will be dealing with configuration and management interfaces that you're already comfortable with. And second, any possible interoperability questions between your existing

INSIDE

Internet access is now pervasive. And so are network security risks. As you've heard over and over, if you open up your network to the Internet, you also open your network to dangerous outside forces. To address this, firewall vendors like Check point and Raptor Systems keep developing products for both Windows NT and Unix. However, major infrastructure vendors are beginning to add firewall components to their existing product families. In this roundup, contributing editor Padraic Boyle takes a look at what Ascend Communications, Cisco Systems, and Livingston Enterprises have to offer.

EASY AND FAMILIAR are two qualities most of us wouldn't find fault with, especially in products as complicated as firewalls. That's why we examine how easy Ascend's Secure Access Firewall, the Cisco PIX, and the Livington FireWall IRX are to set up, and whether their management and configuration utilities mimic those of the other products in the vendors' lines.

VPN IS YET another acronym that you get can't away from these days. In our sidebar on virtual private networking, we try to sort out the latest smattering of protocols for you and explain what your VPN options are. In addition, we tell you about our experience with setting up a VPN between two Cisco PIX boxes.

NETWORK PROTECTION for the common man is what contributing editor Steve Rigney finds in two products from Computer Peripheral Systems. The Basic Mini Firewall and the Enforcer are designed to protect networks with dial-up connections to the Internet from evil invaders. In addition, Steve dives into a new IP Management Product from Meta Info. And in this issue's Multiple Access, Steve Buehler contemplates new hard disk options.

—Sarah L. Roberts

routers and your new security solution are eliminated.

In addition, these new solutions bring you an alternative to implementing Unix- or Windows NT–based firewalls,which have their own sets of issues. For example, many higher-end, Unix-based firewall solutions, such as TIS Gauntlet Internet Firewall, are host-based: They are between a router and the local network, creating a demilitarized zone. The thought here is to inspect the traffic coming in to the DMZ and stop it at the firewall. The firewall can monitor inbound and outbound traffic and, based on an authorization scheme, will allow access in either direction. Although it is an extremely secure design, this solution is expensive to implement.

As for Windows NT–based software firewalls, such as Raptor's Eagle and Check-Point's Firewall-1, these have been gaining ground in the market mostly because they are reasonably priced and easy to configure, and they offer the familiar Windows interface. You will, however, need to invest in your own hardware to run them. But it's important to keep in mind that your choice of a security solution should ultimately be based on what you're most comfortable with and what is best for your network and the data on it.

In this roundup, we take a look at Ascend's Secure Access Firewall software (installed on a Pipeline 30), and we likewise review the Cisco PIX and the Livingston FireWall IRX. Bay Networks and 3Com Corp. also offer solutions but were unable to meet our testing deadline. Each product performed firewalling in a slightly different manner, and they ranged in price from $1,000 for Ascend's Secure Access Firewall software alone to $10,080 for the Cisco PIX.

Editors' Choice

• Secure Access Firewall

With Internet access now the norm for businesses of all sizes, infrastructure vendors are beginning to provide specific security solutions within

their product lines. Of the products we reviewed, we found Ascend Communications' Secure Access Firewall, which can be added to most of Ascend's Pipeline or MAX-series products, to be the best.

For starters, Ascend gives you choices as to how you want to implement your firewall and offers an extremely competitive price. If you already have a product in the Pipeline or MAX family, you can purchase the Secure Access Firewall for $1,000. If you're starting from scratch, you can request the entire Pipeline/MAX-and-firewall package.

Especially useful was Secure Access Manager, which is the Windows-based management utility for the firewall. It lets you configure and manage the firewall easily and quickly, in a familiar GUI environment.

Cisco's PIX is an extremely powerful product, though it's considerably pricier at $10,080. And there's the usual Cisco caveat: If you already have Cisco products running on your network and you're familiar with IOS, you'll like this product. If not, you should think carefully about puchasing a PIX.

SECRETS OF THE SOLUTIONS

Of the three vendors, only Ascend delivered a genuine router-based firewall solution. The Ascend solution stood out in a couple of other ways as well. It was the lowest-priced product in our roundup, and it offered some special firewall capabilites, such as being able to close the ports in the event of an attack.

The Cisco PIX is not a router but rather a host device built around a routing form factor. Just the opposite of the Livingston FireWall IRX, the Cisco PIX is the second-tier networking device that sits behind a router. With a $10,080 price tag for 64 concurrent users, the PIX isn't for everybody. It does, however, add another weapon to the arsenal in the security battle, complementing an already existing Cisco router. It uses a powerful combination of application-level, packet-filtering, and stateful inspection technologies. In addition, Cisco's new cut-through proxy technology, implemented on the PIX, should provide faster performance than most proxy servers.

While touted as a firewall router, the Livingston FireWall IRX uses only the first-generation firewall techniques that make use of packet filtering. It works well as a first line of defense, but a second-tier box is suggested for additional security.

We found each of the three products easy to install and configure, though a basic knowledge of TCP/IP is a must. Each provided either a Windows, a browser-based, or a command line interface (or some combination of the three) for configuring and managing the firewall. And each product also provides basic logging features.

PLAN OF ATTACK

For our tests, we configured each firewall with a network on either side. On one side rested the secure network, which was made up of several clients running Windows 95, along with a server running IIS (Internet Information Services) under Windows NT 4.0, an Linux server running Apache, and an SMTP mail server, also running Linux. On the outside of the firewall were our attack clients. We also put a Windows NT client on the outside, with SAFEsuite Internet Scanner.

First, we ran SIS without any firewall services in place to obtain a baseline. Plenty of holes popped up. Then we installed each firewall solution to see whether SIS could detect any obvious openings. To our delight, each firewall blocked the snooping from the SIS client. We then ran other attacks to see whether any of them could penetrate a firewall's armor, but again to no avail.

Ascend Communications Inc.

Secure Access Firewall

ALL REVIEWS BY PADRAIC BOYLE

A leader in the dial-up ISDN router community, Ascend Communications leaps one step further by bundling Secure Access Firewall with its Pipeline and MAX series of routers. The only true router-based firewall solution in this roundup, the Secure Access Firewall software adds a full stateful-inspection firewall to most of Ascend's line of routers. On our tests, we used Ascend's Pipeline 130 ISDN router with Secure Access Firewall.

If you already have an Ascend Pipeline or MAX router in place, you can purchase the Secure Access Firewall software separately ($1,000 list). You may have to do a flash upgrade on the router before installing the soft-

Mobile³

Fast EtherLink® XL CardBus PC Card.
3Com hits the market with the the fastest 10/100 connectivity in a new CardBus package. Pow!

Give your mobile users a powerful punch. Outfit your new, 32-Bit high performance CardBus notebooks with the fastest 10/100 PC Card in the industry. Only notebooks supporting the CardBus standard provide full 100 Mbps network performance, and only 3Com combines a 32-Bit architecture with lightning-fast Parallel Tasking® technology that is a full 31%* faster than other leading CardBus PC Cards.

Call now to get your evaluation unit for Fast EtherLink 16-Bit or Fast EtherLink XL CardBus for $95 or a free information kit while supplies last.**

The Fast EtherLink XL card not only packs a wallop with 100 Mbps throughput, it also supports 3Com's unique DynamicAccess™ features designed to improve overall network performance and manageability. Also, the Fast EtherLink XL card comes with a full lifetime warranty and is guaranteed compatible with leading CardBus notebooks. And here's another bell-ringer: 3Com's Fast EtherLink XL CardBus PC Card keeps your notebooks running extra cool and safe by drawing at least 50% less power than any other CardBus PC Card.

Now that 3Com has set the standard for Fast Ethernet CardBus performance, who else do you need in your corner?

1-888-906-3COM (ext. 103)
www.3com.com/pccard

Now Available!
Fast EtherLink 10/100 16-Bit PC Card for legacy notebooks.

CardBus Really Connects

©1997 3Com Corporation. 3Com, EtherLink, Parallel Tasking are registered trademarks; DynamicAccess is a trademark of 3Com Corporation.
Industry Standard Perform 3 testing conducted by LANQuest Labs. For a full benchmark report, visit our website at www.3com.com
Limit one (1) per qualifie | business customer per site as determined by 3Com. Dollars in U.S. currency.

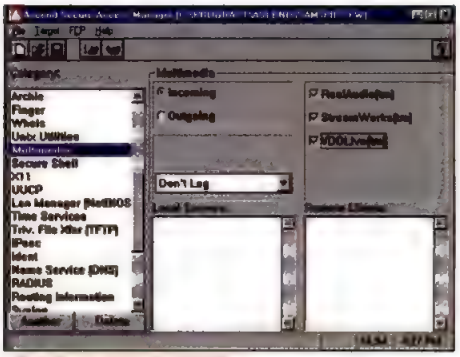
3Com®

ware, however, because it requires the most recent version of Ascend's firmware.

No larger than a best-selling novel, the Pipeline 130 houses an Ethernet port, one ISDN connection, and a T1 or DDS56 WAN connection. Though comparable to the Livingston FireWall IRX in number of WAN ports, the Pipeline 130 lacks a second Ethernet port for connecting to bastion hosts. It is, however, ideal for small to medium-size networks or remote sites.

Installing and configuring the Pipeline 130 consists of several steps. You configure the router portion first from a menu-based terminal connection. Using text-based menus running several levels deep, we filled in the necessary information for routing purposes.

Next, you run Ascend's Secure Access Manager (SAM) to configure the router for firewall duties. SAM is a Windows-based interface that lets you point and click on filter options such as multimedia (RealAudio), IP services (telnet), and other protocols (IPX/SPX) to configure the Secure Access Firewall software. After you configure the firewall portion, the configuration is transmitted up to the Pipeline unit through the SAM software. Once this step is completed, however, you must then return to the console port connection and enable the firewall services on the Pipeline router. If you have had previous experience with setting up and configuring an Ascend router, you won't find this complicated. When the firewall portion of the product detects an attack, it will dynamically reconfigure the ports under attack, log the attack to the syslog located on an-



SECURE ACCESS MANAGER *lets you configure the firewall by simply pointing and clicking.*

BENCHMARK TESTS

Firewalls

PC MAGAZINE LABS

Setting up and configuring these hardware-based firewalls was a relatively easy task to accomplish, but to test them we had to hit them hard with numerous attacks. Amazingly, all the products withstood each of our assaults.

How We Tested

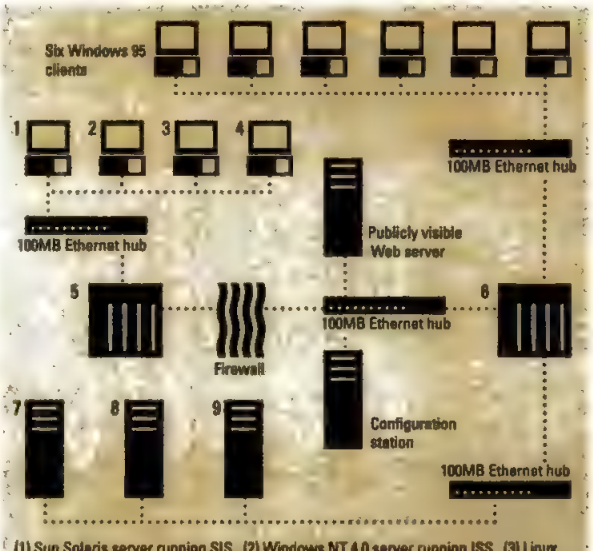
To put Ascend's Secure Access Firewall, the Cisco PIX, and the Livingston IRX FireWall through their paces, we used our new ZD Labs Firewall Test-Bed. When putting together this test-bed, our ZD Labs staff designed it to simulate many of the everyday attacks a corporate network might actually face.

The Firewall Test-Bed consists of a simulated external network connected via the firewall and a router to a simulated internal network. The internal network was made up of six protected Windows 95 clients running TCP/IP connected to a 100Mb Ethernet hub and three common intranet servers—a Windows NT server running Internet Information Server's HTTP and FTP services, a Linux machine running Apache's HTTP and FTP services, and another Linux machine running an SMTP mail server—connected to another 100Mb Ethernet hub. A NetWare MultiProtocol Router connected the two hubs and provided a demilitarized zone as well as a connection to the simulated external network.

The simulated external network consisted of four attacking clients—a Sun Solaris server running Internet Security Systems' SAFEsuite Internet Scanner, a Windows NT 4.0 server running the Windows NT version of SAFEsuite, a Linux machine running a program to flood the SMTP mail server with mail, and a Windows 95 machine running WinNuke. SAFEsuite Internet Scanner works by attacking most known weaknesses of firewalls, including open UDP ports, flooding the firewall with information, and attacking normally open ports. WinNuke corrupts the TCP/IP stack on another Windows machine (running Windows 3.*x*, Windows 95, or Windows NT), while Avalanche and SMTP Mail Bomb flood your servers to produce a denial-of-service situation.

These four clients were connected to a 100Mb Ethernet hub, which was then connected to a Cisco 4700M router. This router simulated the break between the "outside" and "inside" borders.

The firewalls were then placed between the Cisco router and the NetWare MultiProtocol Router. In configuring our test-bed this way, we were able to simulate the attacks listed above and determine how each product would handle those attacks.



(1) Sun Solaris server running SIS. (2) Windows NT 4.0 server running ISS. (3) Linux server running Mail Bomb. (4) Windows 95 server running WinNuke. (5) Cisco 4700M router. (6) NetWare MultiProtocol Router. (7) IIS HTTP/FTP server running Windows NT 4.0. (8) Apache HTTP/FTP server running Linux. (9) SMTP mail server running Linux.

QUARTERDECK

HOW FORTUNATE. PROCOMM PLUS®32 GIVES YOU RELIABLE, EASY WAYS TO SEND AND RECEIVE INFORMATION SO YOU CAN GET THROUGH THE DAY WITHOUT A HITCH. IT SUPPORTS 36 TERMINAL EMULATIONS, 11 FILE TRANSFER PROTOCOLS, AS WELL AS REMOTE CONTROL, FAXING AND ACCESS TO THE INTERNET WITH TELNET, FTP AND A WEB BROWSER. AND, WITH ADVANCED COMMUNICATIONS SCRIPTING CAPABILITIES, YOU'VE GOT FULL TASK AUTOMATION TO BOOT. SO EVERYONE'S HAPPY, YOU LOOK GOOD, AND WHO KNOWS? MAYBE THE ONE ABOUT FAME AND PROSPERITY WILL COME TRUE TOO. FOR MORE INFORMATION ABOUT HOW PROCOMM PLUS 32 CAN STREAMLINE YOUR COMMUNICATIONS, VISIT OUR WEB SITE AT WWW.QUARTERDECK.COM OR CALL 1-800-282-0866 AND MENTION CODE #01722.

PROCOMM PLUS 32
FOR WINDOWS NT/95

© 1997 Quarterdeck Corporation. All rights reserved. All brands and product names are trademarks of their respective holders.

CIRCLE 880 ON READER SERVICE CARD.

SUMMARY OF FEATURES

Router-Based Firewalls

PC MAGAZINE NETWORK EDITION EDITORS' CHOICE

■ YES ▩ NO

Products listed in alphabetical order	Ascend Secure Access Firewall	Cisco PIX	Livingston Firewall IRX
List price of tested configuration	$2,995	$10,080	$3,195
Simultaneous connections supported by tested configuration	Unlimited	64	Unlimited
VPN capability	▩	■	▩
Network address translation	■	■	▩
Filtering Technology			
Packet filtering	▩	▩	■
Stateful filtering	■	■	▩
Filtering Capabilities			
Allows/blocks packets based on IP address	■■	■■	■■
Filters Java/ActiveX applets	▩▩	■▩	▩▩
Filters CU-SeeMe/RealAudio/VDO Live	■■■	■■■	▩▩▩
Filters HTTP/FTP/telnet	■■■	■■■	■[1]■[1]■[1]
Denies users access to specific sites by URL/domain name	■■	■■	■■
Authentication and Security			
TACACS+/RADIUS	■■	■■	▩■
ActivCard/Assurenet Pathways/Enigma Logic	▩■▩	■·■[2]■[2]	■▩
Security Dynamics	■	■[2]	■
Interfaces			
10-Mbps Ethernet / 10/100-Mbps Ethernet / T1 ports	1/0/1	0/2/0	2/0/1
ISDN/analog serial ports	1/0	0/0	0/1
Management			
Runs on Windows 3.x/Windows 95	■■	▩▩	▩■
Runs on Windows NT workstation/Windows NT server/Unix	■■▩	■■▩	■■■
Event logging	■	■	■
Audit trail	▩	▩	▩

(1) The product blocks these protocols by port number only
(2) Requires the Windows NT version of CiscoSecure, which is bundled with Cisco PIX; the Unix version of CiscoSecure is optional

other host, and send an alert to the network administrator via e-mail or pager.

In addition to SAM, Ascend offers its commercially available RADIUS (Remote Authentication Dial-In User Service) server package, called Ascend Access Control (AAC), for an additional $3,000; this authenticates dial-up clients. AAC runs on Windows NT, Solaris, and BSD Unix. Using a Java-based GUI, AAC provides an easy-to-configure method for authenticating clients before gaining access to services through the router.

Similar to PIX, the Pipeline 130 supports network address translation (NAT) to hide IP addresses of internal networks from the outside networks. Ascend does support tunneling technologies such as ATMP, L2TP, and PPTP. It also plans to support the IPsec specification.

Secure Access Firewall. List price: $1,000. Ascend Communications Inc., Alameda, CA; 800-621-9578, 510-769-6001; fax, 510-688-4342; www.ascend.com. *Circle 541 on reader service card.*

Cisco Systems Inc.

Cisco PIX

Unlike the products from Ascend and Livingston, Cisco Systems' PIX firewall solution is a hardware-based firewall designed to sit behind the router that connects to the Internet rather than to replace it. With a list price of $10,080 for 64 concurrent sessions, PIX is aimed at the kind of large corporate site that has a router in place for Internet connectivity, or plans to install one. The PIX, like most Cisco products, is an especially good solution for those who are already familiar with Cisco's products and its IOS (Internetwork Operating System).

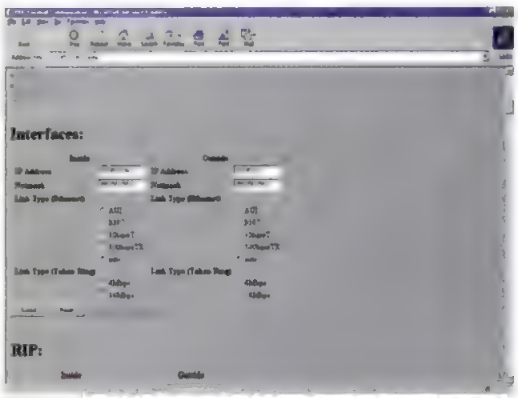
The PIX comes in a black, rack-mountable chassis that houses a 200-MHz processor, two auto-sensing 10/100Mb Ethernet adapters, and a floppy disk drive. Because the product sits behind a router, it lacks any WAN connections. By contrast, the Livingston product offers two WAN ports, and the Ascend product offers one.

Installing and configuring the PIX wasn't difficult. After entering about ten commands via a console port, we were up and ready to go. At the core of the PIX is an IOS-like command line interface for configuring the firewall. Cisco also provides an HTML interface for configuring the PIX, but some basic information such as interface IP addresses must be entered from the command line before the HTML GUI can be used. By the time you read this, Cisco should be shipping a Java-based GUI.

Unlike a standard packet filter router or an application-level (proxy) gateway firewall, the PIX uses a combination of several firewall technologies—application-level, packet-filter, and stateful-inspection. For all intents and purposes, though, the PIX is considered a stateful firewall.

Where the PIX really differs from other firewalls is in its application-level technology. Cisco's enhanced authentication feature and *cut-through proxy* allow the firewall to break away from traditional proxy servers.

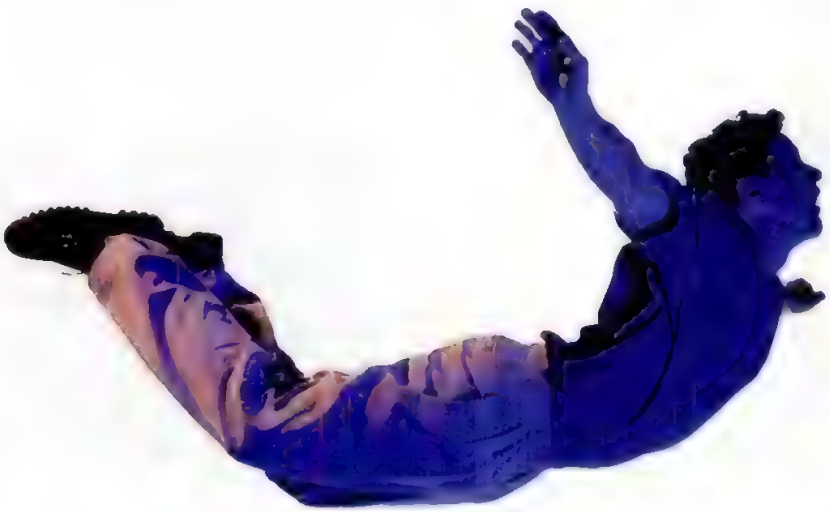
Traditionally, application-level connections are controlled through a proxy server. All data delivered between a client and a remote host must first pass through a proxy server, which adds overhead and can diminish performance. Cisco's cut-through feature provides the initial authentication and connection between the client and remote host and then hands the session over to the client and remote host. This not only ensures a client's access rights but also secures the ports as usable only by the client and host for the remainder of the client/host relationship. Once the session ends, the connection is dropped and the ports are closed. This technique enhances performance by cutting out the middleman



THE PIX *provides a user-friendly, HTML-based configuration interface.*

Seagate Software

is our **NT data invulnerable?**



for sure??
would i bet my job on it?

Introducing Seagate Backup Exec™ for Windows NT 7.0. The only NT backup that is 100% compatible – now and in the future – by virtue of its unique COM/DCOM architecture. And the only backup to read and write to Microsoft Tape Format (MTF). **2,000 tapes??... 2,000 tapes!!!... who's gonna manage them all?** Device and media management have been simplified and automated so you can track and manage your media and protect against accidental overwrites. **how long will it take to recover if the whole stinkin' network goes down?** Backup Exec allows you to restore to the point in time when your system went down, thanks to Seagate Software's Intelligent Disaster Recovery™. In essence, Backup Exec not only saves the data. It saves you time and money as well. Making it part of Seagate Software's new era of information availability, access, and analysis.

you gotta know™

For a free evaluation, 1-800-729-7894 or www.seagatesoftware.com

©1997 Seagate Software, Inc. Seagate Backup Exec, Seagate Software and the Seagate logo are trademarks of Seagate Technology. Outside of the U.S. and Canada call 1-407-531-7894.

CIRCLE 671 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

(the proxy server) after making the initial connection. Ascend announced a similar feature at press time.

In addition to the PIX's stateful firewall technology, Cisco supports a virtual private networks (VPNs) option ($3,000 list) that can connect up to 256 PIX firewalls using L2F.

Cisco PIX. List price: For 64 concurrent sessions, $10,080. Cisco Systems Inc., San Jose, CA; 800-553-6387, 408-526-4000; fax, 408-526-4100; www.cisco.com. *Circle 542 on reader service card.*

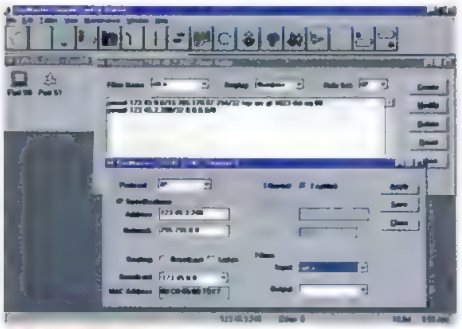
Livingston Enterprises Inc.

Livingston FireWall IRX

Though billed as a full-fledged firewall, the Livingston FireWall IRX—unlike the products from Ascend and Cisco, which use stateful-inspection techniques—is simply a packet-filtering router that accepts or rejects packets based on IP address and origin or destination port. It cannot recognize requests for specific services such as RealAudio, and it lacks support for network address translation and the built-in authentication mechanisms offered by the other two products. The FireWall IRX is most appropriate as a first line of defense, requiring a second stateful-inspection or application-level gateway firewall as a backup. The FireWall IRX can take much of the load off a slower-performing, software-based firewall by assuming some of the firewall's lower-level functions.

The FireWall IRX lists for $3,195, versus $2,995 for the Ascend Pipeline 130 with Secure Access Firewall software. Unlike the Ascend, however, the FireWall IRX comes with two Ethernet ports in addition to its two WAN ports. With one of the WAN ports serving as the Internet connection, you can use one Ethernet port to connect to a bastion host and the other to secure your internal network. The FireWall IRX can even filter packets traveling between the two Ethernet ports. By contrast, the Ascend Pipeline 130 comes with only one Ethernet port. The Cisco PIX has two Ethernet ports but no WAN ports, so one Ethernet port has to be used as a connection to a router.

With its AMD 386 processor, 1MB of RAM, and Livingston ComOS, Version 3.5.1, the FireWall IRX may seem underpowered, but it proved to be very fast. It outperformed the Ascend product by a wide margin and was slightly faster than the Cisco PIX. Keep in mind, however, that with packet-filtering routers, efficient configuration means everything, as the more filters you have in place the longer it takes to process packets.



THE PMCONSOLE *allows administrators to configure and plug in updates to the IRX.*

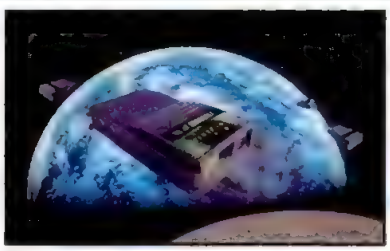
The FireWall IRX is easy to install, with a GUI called PMconsole that you use to configure and monitor the firewall from either a Windows- or Unix-based workstation. You can also use PMconsole to get firmware upgrades from the Livingston Web site. Security events are recorded into the syslog, but as with the other products we tested, there are no built-in features for analyzing recorded events, and you can't configure alerts via e-mail, pager, or SNMP.

The product comes with additional software, called ChoiceNet, that installs on a Unix host and can be used to aid in denying internal clients access to an administrator-defined list of external sites. You can configure ChoiceNet to alert the client that a request has been denied and log the request in the syslog.

Though the FireWall IRX doesn't come with virtual private network (VPN) capabilites at present, Livingston claims it will support virtual private networking via the IPsec standard once the standard is ratified. And while the FireWall IRX doesn't support standard authentication solutions such as Security Dynamics' SecureID, it can pass information from dial-up clients to a RADIUS (Remote Authentication Dial-In User Service) server to authenticate remote users.

Livingston FireWall IRX. List price: $3,195. Livingston Enterprises Inc., Pleasanton, CA; 800-458-9966, 510-737-2100; fax, 510-737-2110; www.livingston.com. *Circle 543 on reader service card.* PC

DID YOU KNOW THAT FOR AS LITTLE AS $199* YOU CAN PLUG ANY PRINTER INTO YOUR NETWORK?



Do you often wonder if there is a less expensive way to print directly to a printer over your Network? If the answer is yes, Ringdale's newest product is just for you.

The new PrintPro '97 pocket sized Printserver is the most compact third generation printer-to-network connectivity solution currently available.

The PrintPro '97 will plug directly into the parallel port of your printer, allowing you to easily connect any laser, line, dot matrix or inkjet printer to a 10baseT Ethernet network.

The PrintPro '97's management is unrivalled ensuring quick and easy installation onto any network environment. A Windows-based TCP/IP printing system is supplied, allowing Internet access to the printer as well as Local Area Network (LAN) printing. The device can also be managed by PeripheralVision™ over the Internet. PrintPro '97 when used with IPS (Internet Printing System), for Windows '95 and Windows NT, allows you to print directly to the printer anywhere in the world.

If you would like more information on the PrintPro '97 or any of Ringdale's other products please contact us free on the number below.

RINGDALE call us toll free 888 288 9080

8305 Highway 71 West Austin Texas 78735

Ph: 512 288 9080 Fax: 512 288 7210 http://www.ringdale.com

*Manufacturer's suggested retail price. Excludes shipping, handling and applicable taxes.

Digging a Data Tunnel

If yours is the usual company with offices scattered around the country, you probably have a private WAN that connects disparate corporate sites, provides Internet connectivity, and supports a stable of remote users. Underlying all this connectivity, however, is a vast sea of high-priced leased lines. You can potentially save a good chunk of the money you spend on leased lines with a *virtual private network*, which can provide secure connections to the corporate network via the Internet for your remote users.

By definition, a VPN is a secure network cobbled together from multiple private networks connected via the Internet. The data is delivered and secured between these points using encryption and authentication. What allows such VPNs to be created is some as yet unratified standards : PPTP, a proprietary protocol from Microsoft; L2F, a proprietary protocol from Cisco; and, for some products, IPSec. L2TP, a combination of Cisco's and Microsoft 's protocols currently before the IETF, would in theory replace PPTP and L2F if ratified.

This cadre of protocols naturally raises the issue of interoperability. The hardware you use to connect the VPN points has to support the same protocol and, in the case of IPsec, often the same flavor of the protocol. Right now, not all products do so. The Cisco PIX we reviewed, for example, supports PIX-to-PIX VPNs via IPsec, Data Encryption Standard (DES), and L2F, but because there isn't an L2F client, remote users can't access your network using the VPN. However, if you have a PPTP-enabled Windows NT RAS server behind your PIXs, you can set up a VPN that way, enabling dial-in via the VPN for remote Windows 95 or Windows NT clients.

During our testing we did set up a PIX-to-PIX VPN, and we found it relatively easy. You simply configure a few strings on each of the PIX boxes so that they can recognize and talk to each other and you're off. We did find, however, that the syntax of the configuration has to be absolutely identical on both sides or the connection won't work. Initially, we set up the strings numerically (1 through 5) on one of the PIX boxes and alphabetically (a through e) on the other. After being unable to get this to work, we discovered our error, corrected the syntax, and connected without any problems.—*Padraic Boyle*

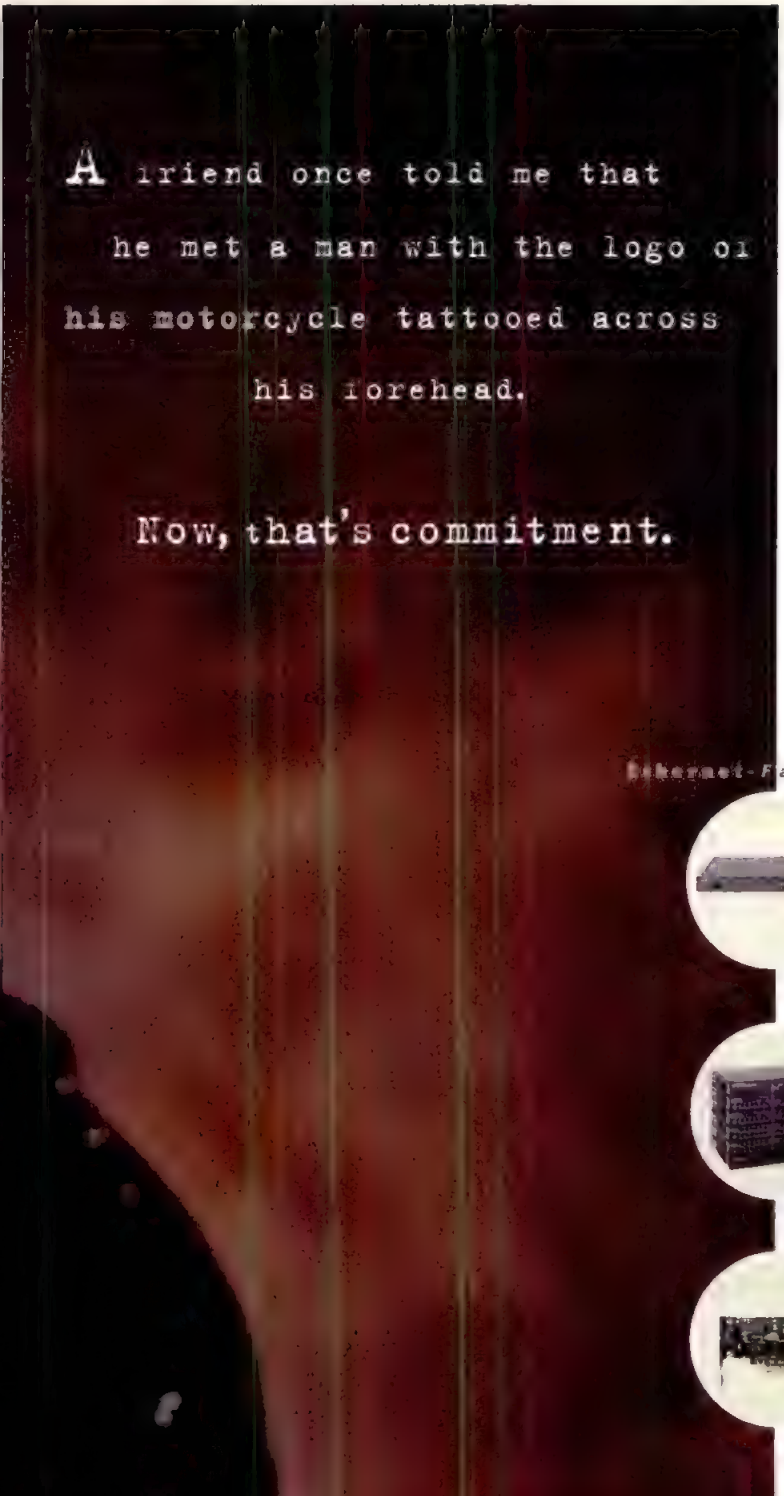
Network Edition Advertisers Index

Reader Service No.	Advertiser	Telephone / Web Address	Page
*	3 Com Corporation	800-NET-3COM / http://www.3com.com	NE3
903	Computer Associates	800-243-9462 / http://www.cheyenne.com	NE15
*	Dell Computer Corporation	800-289-3355 / http://www.dell.com	NE12
855	Micro Solutions Computer Products		346 @
880	Quarterdeck Office Systems	800-683-6696 / http://www.quarterdeck.com	NE5
*	Ringdale	www.ringdale.com/	NE8
871	Seagate Software	800-525-5645 / http://www.nsmg.seagatesoftware.com	NE7 @
909	Standard Microsystems Corp.	800-SMC-4-YOU / http://www.smc.com	NE10-NE11
860	Trend Micro	800-228-5651 / http://www.trendmicro.com	NE16

*No Reader Service#. Please Call Advertiser For More Information.

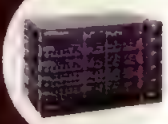
For Network Edition information, use Reader Service Card located in the back of the book.

1-800-SMC-4-YOU • www.smc.com



Ethernet-Fast Ethernet

Switches



Hubs

NICs

SMC is just as committed to giving you the lowest cost of ownership.

That means you spend less money buying our LAN products. And less time installing and maintaining them. It means you get superior performance. Rock-solid reliability. And the industry's best service and support—so when you have a question, it gets resolved. Fast.

Sound simple? It should. Because your job is tough enough.

Find out what our brand of commitment can mean for you. Call 1-800-SMC-4-YOU and ask about how you can save up to 40% on our new 10/100 switches. Or visit the promotion section of our Web site at www.smc.com.

SMC®

Focused on the LAN.
Committed to the customer.

CIRCLE 909 ON READER SERVICE CARD

GROWTH HAPPENS. MANAGE IT.

DELL POWEREDGE 2200 SERVER
233MHz PENTIUM II PROCESSOR
(Dual Processor Capable, RAID Capable)

- 64MB ECC EDO Memory (512MB Max)
- 512KB Integrated L2 ECC Cache
- Integrated PCI Ultra-Wide SCSI-3 Controller
- 4GB Ultra-Wide SCSI-3 Hard Drive (27GB Max)
- 8X SCSI CD-ROM Drive
- Intel® Pro/100B PCI Ethernet Adapter
- ★ **MS® Windows NT® Server 4.0 (10 Client Access Licenses)**
- ★ **3Com OfficeConnect Hub 8-port/TPC**
- Intel® LANDesk® Server Manager v2.5x
- 6 Expansion Slots: 3 PCI, 3 EISA
- 6 Drive Bays: 3 Hard Drive, 3 Removable Media
- ★ **3 Years Next Business Day On-site[1] Service**
- 7x24 Dedicated Server Hardware Technical Telephone Support
- ★ *APC Smart-UPS 700w Power Supply, add $399.*

$4499

Business Lease[2]: $156/Mo.
Order Code #250087

THE DELL POWEREDGE 2200 SERVER. EXPANDABILITY FOR YOUR GROWING BUSINESS.

Just because growth is unpredictable doesn't mean it has to be unmanageable. Especially since the Dell PowerEdge 2200, the feature-optimized server with the perfect mix of performance and expandability, can be yours for one of the best prices in the industry. Advanced technology like Pentium® II processors, dual processing capability, and an optional RAID feature deliver outstanding performance. Call Dell today and we'll start building a PowerEdge server for your growing business immediately. Since it's never too early to get a jump on the competition.

MMX™ intel inside pentium® II processor

DELL

TO ORDER TOLL-FREE
888-695-3355
TO ORDER ONLINE
www.dell.com/buydell
Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT In Canada, call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04543

For a complete copy of our Guarantees or Limited Warranties, please write Dell USA L.P., Attn: Warranties, One Dell Way, Box 12, Round Rock, TX 78682. [2]Leasing arranged by third party leasing companies to qualified companies. [1]On-site service is provided by an independent third-party provider and may not be available in certain remote areas. *Prices and specifications valid in the U.S. only and subject to change without notice. Intel, the Intel Inside Logo, Pentium and LANDesk are registered trademarks and EtherExpress, the Pentium Processor logo, Pentium Pro Processor logo, and MMX are trademarks of Intel Corporation. MS, Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. 3Com is a registered trademark of 3Com Corporation. DirectLine is a service mark of Dell Computer Corporation. ©1997 Dell Computer Corporation. All rights reserved.

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

DNS SERVERS

Meta-IP Is Mega-Easy

By Steve Rigney

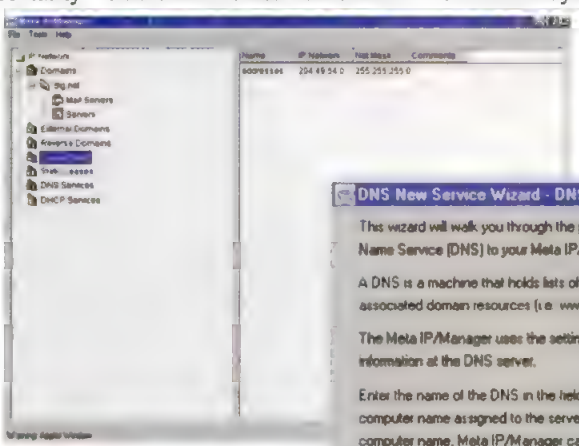
If you're running the TCP/IP protocol on your Windows NT network, you're probably aware of the uncommunicative natures of the built-in Domain Naming System (DNS) and Dynamic Host Configuration Protocol (DHCP) servers. These free servers are fairly easy to install, but they don't update each other and cannot be managed from a single location. If you have only a handful of PCs, this might be acceptable, but if you have tens or hundreds of PCs, an IP management utility can be a lifesaver.

MetaInfo's Meta IP 3.0 ($995 list), a DNS and DHCP server with management software, is one of the most powerful and inexpensive IP management solutions for Windows NT. And features such as installation wizards and Dynamic DNS, which allow the DNS and DHCP servers to talk to and update each other, make the utility a breeze to use and a great value.

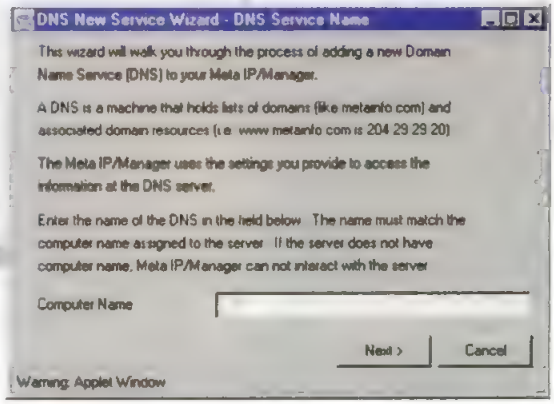
DNS servers assign a user-friendly name to an IP address. For example, a DNS server will let you name a server "sales.acme.com" instead of using the corresponding IP address, 10.12.18.65. Likewise, DHCP servers let you lease an IP address to a client PC, so you can share addresses with multiple users. DNS and DHCP servers don't communicate with each other, however, so each time you make a change to one, you have to update the other.

To address this, Meta IP 3.0 includes Dynamic DNS and DHCP servers that can talk to each other using a common Microsoft Access–based database. The Meta IP DNS server is based on the Berkeley Internet Name Domain (BIND) 8.1.1 specification and works with the open Dynamic DNS protocol. It communicates with the DHCP server using the DDNS protocol to update information. For example, when DHCP leases an address to a client PC, it can look in the DNS database to see if there is a name associated with that address, and then pass it on to the client. On the flip side, the DHCP server can grab the NetBIOS name of the client PC and associate it with an IP address and give the name and address information to the server. This dynamic addressing isn't available in the Windows NT DNS and DHCP servers but is found in more expensive DNS/DHCP solutions, such as Quadritek's QIP.

If you have Macintosh and Unix clients that do not provide NetBIOS names, you can assign DNS names to their Media Access Control (MAC) addresses. As with the dynamic addresses and names, the MAC-based names are also stored in the central database.



META IP'S *manager provides a single window you can use to view all of your DNS and DHCP servers on the network.*



META IP'S *Windows NT–based wizard makes installation of the DNS and DHCP servers an easy task.*

Both Meta IP's DNS and DHCP servers include installation wizards that help you with configuration. The servers run as services on servers using Windows NT 3.51 or later or Workstation-based PCs. The product is easy to install, which is fortunate, as the online-only documentation is scant. To install the servers, the only information you must know is their names, IP addresses, and subnet masks, and the IP address range you want to use for your lease pool.

A special feature of Meta IP's DHCP server is real-time replication. If you set up a second DHCP server and configure it as a backup, the primary DHCP server will update the backup server every time it leases a new address to a client. (Other DHCP servers require you to replicate information manually or at a preset time, so you could easily lose addresses if the primary server crashes.)

The Meta IP Manager runs as a Java applet and will work with most versions of Internet Explorer and Netscape. We weren't able to log on when we used Netscape Navigator Gold, Version 3.0, but MetaInfo is working on a fix for this bug.

The Meta IP Manager is standards-based, so you can manage almost any third-party DNS or DHCP server remotely. (Other IP management utilities can manage only their own servers.) You can use the Meta IP Manager to view all your servers, add records, change settings, and create address pools. Meta IP also includes two performance monitors that let you view the status of your servers and determine whether they are overworked.

Meta IP 3.0. List price: For up to 25 DHCP clients, $995. MetaInfo Inc., Seattle; 206-674-3714; fax: 206-674-3800; www.metainfo.com. *Circle 544 on reader service card.*

NETWORK SECURITY

No-Frills Firewalls

By Steve Rigney

A dedicated, high-speed Internet connection, much less a firewall to protect internal data, is often just a dream for small businesses. Although Computer Peripherals Systems can't make T1 lines cheaper to install or maintain, the company has addressed the issue of a firewall for dial-up Internet connections with its Basic Mini Firewall ($85 list) and the Enforcer ($125 list). These products are hardware-based switches that make sure that when you're connected to the Internet via your modem, your LAN connection is broken. Though the concept is simple, the products work, and they're inexpensive.

The biggest drawback we experienced when using the products involved the frequent loss of the network connection, particularly if there are many dial-up sessions throughout the day. If you are working on a document or running a network application, for example, an automatic network disconnect could cause error messages—or worse, corrupt your data. These products aren't sophisticated enough to handle authentication, so users cannot dial in to the network remotely.

The Basic Mini Firewall is a small external device about the size of an AUI transceiver. The unit has two RJ-11 modem jacks on one side and two RJ-45 network connections on the other. One RJ-11 goes to the wall and the other to your modem. Similarly, you attach one RJ-45 connector to your internal network adapter and the other to the cable going to the remainder of your LAN. The rest is simple: When your modem makes or answers a call, your connection to the LAN is broken. When you hang up the modem, the connection to the LAN is reestablished. The Basic Mini Firewall, however, cannot determine whether you're calling the Internet, an online service, or a BBS, and it disconnects your LAN connection regardless of what your modem is connecting to. If you frequently make dial-in connections, the loss of your network connection can be annoying.

THESE FIREWALLS *provide protection for dial-up connections.*

The Enforcer is like the Basic Mini Firewall and includes a software utility called Reconnect. This utility allows you to launch a program, such as an antivirus application, before the Basic Mini Firewall reconnects you to the LAN. Reconnect also offers password protection to prevent intruders from reestablishing your LAN connection, and it runs under DOS, Windows 3.*x*, and Windows 95.

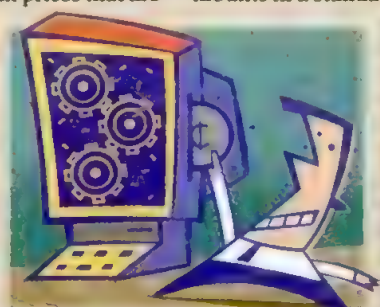
Both products have LEDs that alert you when the LAN is disconnected. Computer Peripheral Systems also offers a wall-jack model of the Enforcer. If you decide you don't like Reconnect, you can change a jumper setting on the Enforcer to make it function just like the Basic Mini Firewall. **Basic Mini Firewall**. List price: $85. **Enforcer**. List price: $125. Computer Peripheral Systems Inc., Atlanta; 770-908-1107; fax, 770-908-1208; www.cpscom.com. *Circle 545 on reader service card.*

MULTIPLE ACCESS By Steve Buehler

Cheap Disk Tricks

Perhaps more than any other single factor, the price of hard disks determines how quickly new advances in computing are made available to the mass market. With prices that are now pennies per megabyte, hard disks have become new tools to be exploited not just to store your data but also to make your network administration tasks easier.

Two products that support this thinking slid across my desk the other day. The first one was the Image Masster 200P, a portable hard disk duplicator from ICS Computer Solutions (*www.ics-iq.com*). This portable platform allows you to duplicate an IDE disk onto two target disks, even if the targets differ in size and geometry. If you set up a user's machine with one partition for the supported OS and standard programs and another partition for the user's data, updates and even catastrophic disk recovery become a simple task. If catastrophe does strike, back up only the user's data (if possible) to a Zip or JAZ drive, pull the disk out of the PC, copy the new standard image onto it, and then reload the user's data. After you've reset network information, like the IP address, the user is up and running again. The portable Image Masster 200P ($1,700 list) hooks up to a PC parallel port for control information, with add-ons available for specialized copying and diagnostic testing.



The second product not only slid across my desk, it hit the floor, bounced, and kept going. The Summatec Mirror Link ($399 list; *www.summatec.com*) is a case with a 1GB laptop hard disk inside (larger drives are available). The case mounts in a standard PC disk bay, and the hard disk can be removed from the case. You can remove the hard disk to store it in a secure place when you leave your desk, you can take it with you when you leave, or—as we are starting to do here at ZD Labs—you can use it as the IDE boot disk in your server. It's a simple matter then to swap a disk with NetWare for a disk with Windows NT, so within minutes I can test servers running under different OSs . I'm going to install Mirror Link on my home machine as a data disk, so when I'm done with work data, I can remove it from the machine and put in a different Summatec disk with my Quicken data. Same machine, two uses, and great security.

With hard disks as inexpensive as they are, these two products leverage the use of additional disks to help solve several problems for network administrators. Check these out: They're inexpensive ways to make your life easier.

PHOTOGRAPH BY THOM O'CONNOR

Your Computer Guy Will Hug You. Your Bookkeeper May Kiss You.

Save $1,500 On The ServerSuite Designed Exclusively For Small Business.

Cheyenne® ServerSuite™ 3.0 includes three award-winning, industry-leading products that deliver a turnkey solution for all your critical server needs: storage management, anti-virus and fax communications. And for a truly affordable price. The $995 suggested retail price represents a savings of more than 60% if each product were purchased separately.

ARCserve®, Novell's preferred storage management solution, is the industry's best-selling data backup and restore product. It gives you total protection for all of your critical data.

InocuLAN®, Novell's preferred anti-virus solution, is the best anti-virus software you can buy. It offers the most advanced and comprehensive virus protection for your entire network — server and workstations.

FAXserve™, Novell's recommended fax solution, eliminates the need for paper faxes. With FAXserve, there's no more standing at the fax machine, employees can fax right from their desktop computer maximizing productivity and ensuring privacy. All three of these outstanding products will save you time, money and frustration.

Call today and find out how ServerSuite can help your small business. And if anybody gets too close, tell them a simple thank you will do.

Call 1-800-991-4438 For A Free Trial
Or Visit Us At www.cheyenne.com/adver1/ss3

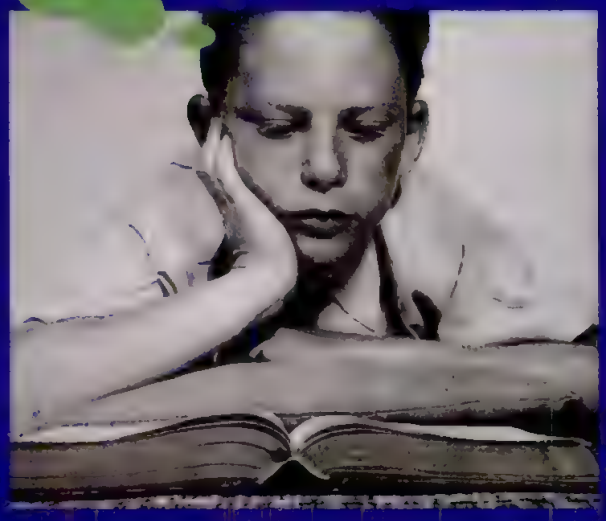
COMPUTER® ASSOCIATES
Software superior by design.

©1997 Computer Associates International, Inc., Islandia, NY 11788-7000 All other product names referenced herein are trademarks of their respective companies.

CIRCLE 903 ON READER SERVICE CARD

INTEL
NOVELL
NETSCAPE
SUN
CONTROL DATA
WORLDTALK
NETMANAGE
TREND
A virus sees no walls
between continents, nations,
networks or desktops . . .
. . . which is why you'll find us
EVERYWHERE.
www.antivirus.com/pcmag.html
1-800-238-9983
TREND

Cogito ergo sum...



LEARN A LANGUAGE YOU MIGHT ACTUALLY USE SOMEDAY.

A sample of the courses offered online at ZDU:

Photoshop
C++
Visual Basic
HTML
Java Applets
Java
Windows NT
VRML
Excel
Web Design
Delphi
Et cetera

That Latin you learned in high school probably isn't going to impress your boss. But knowing C++, Java or HTML just might. A good reason to check out ZDNet University, the place to take online classes in a range of computer-related subjects, from programming to web design to applications. ZDU is a great way to polish your skills or get ahead in your job. And best of all, you won't need a student loan—$4.95 a month gets you unlimited course enrollment. Visit our online campus at www.zdu.com and start learning now. In other words, *carpe diem*.

Unlimited Course Enrollment: only $4.95 a month

ZDNet University

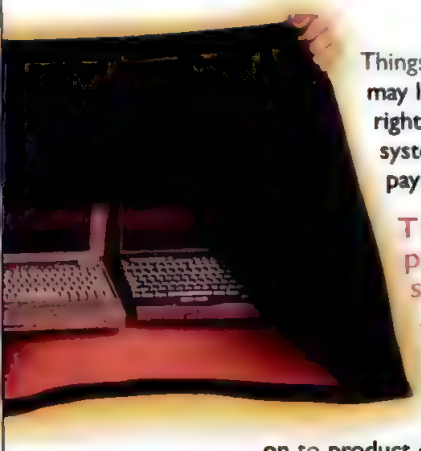
THE MOST TRUSTED COMPUTER LEARNING SITE ONLINE

Log on and learn: www.zdu.com

ZDNet and ZDNet University are registered trademarks of Ziff-Davis. All other trademarks are the property of their respective holders.

"I don't know how he **does it**, but

Maurice, my account manager at CDW®, always comes up with product alternatives" that save my company money.



Things aren't always what they seem. What may look like a real steal may be downright unproductive for your company's system. Or you could be wasting money paying for something you don't need.

There's someone at our place who can help you sort it all out.

He's your CDW account manager. And once he gets to know you, your company's purchase history and your system, he can turn you on to product options that are more cost-effective and productive for your company. And save you a lot of time and aggravation in the process.

Get more than just a great price.

For example, he'll answer your toughest compatibility questions before they become problems. Get you the **free tech support** you need before you need it. And, of course, line up the right price for you.

So give us a call. We'll set you up with your own product options expert. A business computer specialist who knows what's happening with all the different products from all the different manufacturers. That way, your company can choose from a huge selection of brand-name products like **IBM®**, **Compaq®**, **Hewlett-Packard®**, **Toshiba®** and **Microsoft®** at the best prices, in stock, ready for overnight delivery, and easy credit. You'll also get someone who can help you make the most of it all. And some honest, friendly, professional advice that will save you more than money.

Call today and get some free, objective advice and a free CDW catalog.

Check out some of our products and prices in the back of the magazine. Then give us a call. We'll send you our complete catalog. Or check us out at **www.cdw.com**. We think you'll discover that when it comes to getting the right, unbiased advice, as well as the right price, CDW is your only viable alternative.

CDW COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.™

CIRCLE 360 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

800-761-4239 See our ad in the back

CDW® and Hewlett-Packard offer you a rare sales tool. It's called double coverage.

CDW and Hewlett-Packard offer the perfect balance of solutions, savings and selection.

All Hewlett-Packard printer and computer products combine value pricing with advanced performance, upgradeability and superior dependability with a host of features tailored to suit all of your home office and business needs.

At **CDW**, we'll give you more than just a great price. We'll set you up with your own personal account manager who'll offer honest, friendly and professional advice that'll save you more than money. We'll custom configure your new computer purchase–we'll even ship it the same day you buy it. Our team of Hewlett-Packard-trained technicians will offer up their expertise and support should you need it. And we'll provide you the comfort of knowing that **CDW** is the leading direct reseller of Hewlett-Packard products–we know Hewlett-Packard like no one else.

HEWLETT® PACKARD

"Together **CDW** and Hewlett-Packard comprise a powerful partnership– providing solutions for all of your computing needs."

Printers

HEWLETT® PACKARD

HP Color LaserJet 5 printer
HP Image REt 1200
10 ppm black, 3 ppm color
20MB RAM std., 84MB max.
Printer language: enhanced HP PCL 5
250-sheet input tray
1-year on-site warranty
HP C3961A
$3964.71 CDW 65565

HP Color LaserJet 5M
36MB RAM std., 76MB max.
Adobe PostScript Level 2
HP JetDirect card for Ethernet and LocalTalk
CDW 65566 $5027.24

HP LaserJet 5Si printer
600 x 600 dpi with REt
24 ppm
4MB RAM std., 132MB max.
Printer language: enhanced HP PCL 5
Two 500-sheet input trays; one 100-sheet multipurpose tray
1-year warranty
HP C3166A
$2449.62 CDW 60916

HP LaserJet 5Si MX
12MB RAM std., 76MB max.
Adobe PostScript Level 2, HP JetDirect card for 10BASE2, 10BASE-T and LocalTalk
CDW 60917 $3556.38

HP LaserJet 5Si NX
HP JetDirect Card for Ethernet 10BASE-T
CDW 80517 $2739.02

HP LaserJet 5se printer
600 x 600 dpi with REt
12 ppm
4MB RAM std., 66MB max.
Printer language: HP PCL 6
Up to four paper input bins
HP LaserJet Internet Publishing Kit CD-ROM
1-year warranty
HP C3082A
$1049.00 CDW 84961

HP LaserJet 5M
6MB RAM std., 52MB max.
Adobe PostScript Level 2
HP JetDirect card for Ethernet 10BASE-T/BNC and LocalTalk
CDW 67781 $1617.24

HP LaserJet 5N
HP JetDirect card for Ethernet 10BASE-T
CDW 67780 $1374.22

HP DeskJet 1000Cse printer
Up to 600 x 600 dpi black and 600 x 600 dpi (C-REt) color
Up to 6 ppm black and 3.5 ppm color
512KB RAM built-in
Up to 150 sheets, 15 envelopes and 60 cards
Corel PrintHouse Select V1.1 and My Color Marketing Materials
1-year warranty
HP C2670A
$499.00 CDW 85326

HP LaserJet 6Lse printer
600 x 600 dpi with REt
6 ppm
1MB RAM std., 9MB max.
Printer language: enhanced HP PCL 5
100-sheet paper input bin
HP LaserJet Internet Publishing Kit CD-ROM
1-year warranty
HP C3994A
$399.00 CDW 85327

HP LaserJet 6Pse
8 ppm
2MB RAM std., 50MB max.
Printer language: HP PCL 6 with MEt
One 250-sheet universal cassette tray; one 100-sheet multipurpose tray
CDW 85329 $799.00

HP DeskJet 672C printer
Up to 600 x 600 dpi black and 600 x 300 dpi color
Up to 4 ppm black and 1.5 ppm color
512KB RAM built-in
Up to 100 sheets, 20 envelopes and 30 cards
PrintPaks Pop-Up Greetings Kit II CD-ROM
1-year warranty
HP C5886A
$199.00 CDW 85325

Desktops

QUALITY EXPRESS SERVICE

One great plan. One great price.

Only $269

Should you have a computer problem, simply make one TOLL-FREE CALL!

Call your CDW account manager for details!

HP Brio 8012 PC

Mini-tower
166MHz Pentium MMX
256KB L2 cache
16MB EDO RAM
2.1GB EIDE hard drive
-
S3 Trio 64V2
Two USB ports
Microsoft Windows 95
3-year limited warranty

$1017.39 CDW 95050

200MHz Pentium MMX/16MB/2.1GB
CDW 95052 $1154.35

HP Brio 8174 PC

Mini-tower
200MHz Pentium MMX
256KB L2 cache
32MB EDO RAM
2.1GB EIDE hard drive
24X Max
S3 Trio 64V2
56K bps modem
Microsoft Windows 95
3-year limited warranty

$1635.54 CDW 95058

166MHz Pentium MMX/2.1GB/16X Max CD
CDW 95057 $1379.29

HP Brio 8178 PC

Mini-tower
233MHz Pentium MMX
256KB L2 cache
32MB EDO RAM
6GB EIDE hard drive
24X Max
Matrox Millennium
56K bps modem
Microsoft Windows 95
3-year limited warranty

$2117.37 CDW 95061

233MHz Pentium MMX/4GB/24X CD
CDW 95060 $1869.90

Call a CDW account manager, today

for the complete line of Hewlett-Packard handheld computers and notebook PCs.

HP Vectra VE Series 3 PC

Desktop
133MHz Pentium
16MB EDO RAM
1.6GB EIDE S.M.A.R.T. hard drive
Optional CD-ROM
SiS 6205 graphics with up to 2MB DRAM
HP TopTOOLS management software
Windows® V3.11 or Windows 95
3-year limited warranty

$999.36 CDW 91103

166MHz Pentium/1.6GB
CDW 91105 $1038.97
200MHz Pentium/1.6GB/10BT
CDW 91107 $1048.80

HP Vectra VL Series 5 PC

Desktop
166MHz Pentium
256KB L2 cache
16MB EDO RAM
1.6GB EIDE S.M.A.R.T. hard drive
Optional CD-ROM
64-bit S3 Trio64 V2 graphics
HP TopTOOLS management software
Windows® V3.11 or Windows 95
3-year limited warranty

$1166.30 CDW 85717

166MHz Pentium MMX/2.5GB/8X CD
CDW 91115 $1377.00
200MHz Pentium MMX/32MB/2.5GB
CDW 91119 $1598.63

HP Vectra VL Series 5 PC

Mini-tower
166MHz Pentium
512KB L2 cache
16MB EDO RAM
2.5GB EIDE S.M.A.R.T. hard drive
Optional CD-ROM
64-bit S3 Trio64 V2 graphics
HP TopTOOLS management software
Windows® V3.11 or Windows 95
3-year limited warranty

$1229.50 CDW 86527

166MHz Pentium/2.5GB/8X CD
CDW 86421 $1519.54
200MHz Pentium/2.5GB/8X CD
CDW 84733 $1395.28

HP NetServer E40 Series

Tower
200MHz Pentium Pro
256KB L2 cache
32MB EDO RAM
2.1GB Fast SCSI hard drive
8X CD-ROM
10/100Mbps Ethernet
Novell IntranetWare for Small Business
1-year on-site warranty

$2284.17 CDW 91480

Your one-stop source.

CDW is the #1 reseller of Hewlett-Packard products in the direct marketing channel.

We've got the best selection of Hewlett-Packard computers at the right prices, in stock and ready for overnight delivery. And we have all of the software and peripherals you need to custom-build your system. We'll even take care of the hard stuff like installation and technical support...free.

Just give us a call.

CDW COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.

800-761-4239 See our ad in the back

©1997 CDW® Computer Centers, inc. PC Magazine 10/7/97 PCM2338 www.cdw.com/pcg
CIRCLE 168 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/Readerlink

CDW® has the brands you

Notebooks

Model	Processor	RAM std/max	Hard drive	CD-ROM	Color display	Modem	Pointing device	Features	Price	CDW
Toshiba										
Satellite 220CDS	133MHz Pentium	16MB/144MB	1.34GB	10X	12.1" dual scan	—	AccuPoint track stick	Lithium ion battery	$1899.13	89777
Satellite Pro 440CDX	133MHz Pentium MMX	16MB/144MB	1.34GB	10X	12.1" dual scan	—	AccuPoint track stick	Lithium ion battery	$2359.54	90351
Satellite Pro 440CDT	133MHz Pentium MMX	16MB/144MB	1.34GB	10X	12.1" active matrix	33.6K bps	AccuPoint track stick	Lithium ion battery	$2799.55	90352
Satellite Pro 460CDT	166MHz Pentium MMX	32MB/160MB	2.02GB	10X	12.1" active matrix	33.6K bps	AccuPoint track stick	Lithium ion battery	$3659.16	90353
Portege 300CT	133MHz Pentium MMX	32MB/64MB	1.5GB	—	10.4" active matrix	33.6K bps	AccuPoint track stick	external floppy	$3369.46	90354
Portege 680CDT	150MHz Pentium	16MB/80MB	1.2GB	10X	11.3" active matrix	28.8K bps	AccuPoint track stick	external floppy	$3899.63	77243
Tecra 500CDT	120MHz Pentium	16MB/144MB	1.26GB	6X	12.1" active matrix	28.8K bps	AccuPoint track stick	16-bit stereo sound	$1995.94	70243
Tecra 510CDT	133MHz Pentium	16MB/144MB	2.1GB	10X	12.1" active matrix	28.8K bps	AccuPoint track stick	16-bit stereo sound	$2699.76	77241
Tecra 520CDT	166MHz Pentium MMX	32MB/160MB	2GB	10X	12.1" active matrix	33.6K bps	AccuPoint track stick	SVGA resolution	$4159.45	90355
Tecra 530CDT	166MHz Pentium MMX	32MB/160MB	2GB	10X	12.1" active matrix	33.6K bps	AccuPoint track stick	XGA resolution	$4579.17	90359
Tecra 730XCDT	150MHz Pentium MMX	16MB/144MB	2GB	10X	12.1" active matrix	28.8K bps	AccuPoint track stick	full duplex speakerphone	$3499.77	80957
Tecra 740CDT	166MHz Pentium MMX	16MB/144MB	3GB	10X	13.3" active matrix	28.8K bps	AccuPoint track stick	video conferencing kit	$4849.62	87964
Tecra 740CDT	166MHz Pentium MMX	16MB/144MB	3GB	10X	13.3" active matrix	28.8K bps	AccuPoint track stick	Windows NT V4.0	$4999.31	87965
Compaq Armada										
1530DM	133MHz Pentium MMX	16MB/80MB	1.4GB	10X	12.1" dual scan	33.6K bps	touch pad	full duplex speakerphone	$2499.00	91507
1550DMT	133MHz Pentium	16MB/80MB	1.4GB	10X	12.1" active matrix	33.6K bps	touch pad	full duplex speakerphone	$2999.00	87070
1580DMT	150MHz Pentium MMX	16MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	touch pad	full duplex speakerphone	$3499.00	90959
4130T	133MHz Pentium	16MB/48MB	1.08GB	—	11.8" active matrix	—	touch pad	16-bit stereo sound	$2497.23	71116
4131T	133MHz Pentium	16MB/48MB	1.4GB	—	12.1" active matrix	—	touch pad	16-bit stereo sound	$2849.00	80775
4150	150MHz Pentium MMX	16MB/80MB	1.6GB	—	12.1" dual scan	—	touch pad	16-bit stereo sound	$2999.00	91508
4160T	166MHz Pentium MMX	16MB/80MB	2GB	—	12.1" active matrix	—	touch pad	16-bit stereo sound	$3999.00	91509
7330T	150MHz Pentium MMX	16MB/128MB	2.1GB	—	12.1" active matrix	—	EasyPoint III track stick	16-bit stereo sound	$3799.00	93735
7350MT	166MHz Pentium MMX	32MB/128MB	2.1GB	—	12.1" active matrix	33.6K bps	EasyPoint III track stick	16-bit stereo sound	$4499.00	93736
7710MT	150MHz Pentium MMX	16MB/144MB	1.6GB	optional	12.1" active matrix	33.6K bps	EasyPoint III track stick	64-bit PCI bus	$3699.00	88242
7730MT	166MHz Pentium MMX	32MB/144MB	2.1GB	optional	12.1" active matrix	33.6K bps	EasyPoint III track stick	64-bit PCI bus	$4399.00	88241
7750MT	166MHz Pentium MMX	32MB/144MB	2.1GB	optional	12.1" active matrix	33.6K bps	EasyPoint III track stick	64-bit PCI bus	$4999.00	88240
Compaq Presario										
1610	150MHz Pentium MMX	16MB/80MB	1.6GB	14X	12.1" dual scan	—	touch pad	16-bit stereo sound	$2699.00	90515
1585DMT	150MHz Pentium MMX	16MB/80MB	2.1GB	12X	12.1" active matrix	33.6K bps	touch pad	16-bit stereo sound	$3499.00	92232
IBM ThinkPad										
380	150MHz Pentium	16MB/80MB	1.08GB	optional	12.1" dual scan	—	TrackPoint III track stick	16-bit stereo sound	$1699.46	86302
380D	150MHz Pentium	16MB/80MB	1.35GB	8X	12.1" dual scan	—	TrackPoint III track stick	16-bit stereo sound	$1999.50	86304
380D	150MHz Pentium MMX	16MB/80MB	2.1GB	8X	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$3287.43	86305
560	133MHz Pentium	8MB/40MB	2.1GB	—	11.3" dual scan	—	TrackPoint III track stick	external floppy	$1899.56	81184
560	133MHz Pentium	8MB/40MB	2.1GB	—	12.1" active matrix	—	TrackPoint III track stick	external floppy	$3789.45	81186
560E	150MHz Pentium MMX	16MB/80MB	2.1GB	—	11.3" dual scan	—	TrackPoint III track stick	16-bit stereo sound	$2599.86	89290
560E	166MHz Pentium MMX	16MB/80MB	2.1GB	—	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$4186.26	89291
760ED	133MHz Pentium	16MB/72MB	2.1GB	6X	12.1" active matrix	28.8K bps	TrackPoint III track stick	XGA resolution	$3739.72	74862
760E	150MHz Pentium	16MB/72MB	2.1GB	optional	12.1" active matrix	28.8K bps	TrackPoint III track stick	XGA resolution	$3578.40	74863
760XL	166MHz Pentium MMX	16MB/104MB	2.1GB	optional	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$3769.88	84102
760XL	166MHz Pentium MMX	32MB/104MB	2.1GB	optional	12.1" active matrix	—	TrackPoint III track stick	Windows NT V4.0	$4064.04	84103
760XD	166MHz Pentium MMX	32MB/104MB	3GB	8X	12.1" active matrix	28.8K bps	TrackPoint III track stick	XGA resolution	$4679.37	84101
765L	166MHz Pentium MMX	32MB/104MB	3GB	—	13.3" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$5999.71	89293
765D	166MHz Pentium MMX	32MB/104MB	3GB	8X	13.3" active matrix	28.8K bps	TrackPoint III track stick	Mwave DSP subsystem	$5659.22	89292

COMPAQ

Armada 1530DM
133MHz Intel Pentium® MMX
16MB RAM standard, expandable to 80MB
1.4GB hard drive
10X CD-ROM drive
12.1" dual-scan color display
33.6K bps data/fax modem
$2499.00 CDW 91507

COMPAQ

Armada 7730MT
166MHz Intel Pentium® MMX
32MB RAM standard, expandable to 144MB
2.1GB hard disk drive
Optional 8X CD-ROM drive
12.1" active-matrix color display
Integrated 33.6K bps data fax modem with DSVD
$4999.00 CDW 88241

HITACHI

VisionBook Plus 4140
133MHz Intel Pentium®
16MB RAM
1.4GB hard drive
10X CD-ROM drive
12.1" dual-scan color display
33.6K bps data/fax modem
$1799.00 CDW 91046

IBM®

IBM® ThinkPad® 380D
150MHz Intel Pentium®
16MB EDO RAM standard, expandable to 80MB
1.35GB hard drive
8X CD-ROM drive
12.1" dual-scan SVGA color display
$1999.50 CDW 86304

IBM®

IBM® ThinkPad® 760XD
166MHz Intel Pentium® MMX
32MB EDO RAM standard, expandable to 104MB
3GB hard drive
8X CD-ROM drive
12.1" XGA active-matrix color display
28.8K bps data/fax modem
$4679.37 CDW 84101

TOSHIBA

Libretto 50CT
75MHz Intel Pentium®
16MB EDO DRAM standard, expandable to 32MB
772MB hard drive
1.44MB external 3.5-inch PC card
6.1" active-matrix display
$1929.45 CDW 90350

know at prices you love!

Notebooks

Model	Processor	RAM std./max.	Hard drive	CD-ROM	Color display	Modem	Pointing device	Features	Price	CDW
AST Ascentia										
A60+	150MHz Pentium	16MB/80MB	1.44GB	10X	12.1" active matrix	—	SmartPoint touch pad	SRS 3D sound	$2658.65	86918
A60+	150MHz Pentium	16MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	SmartPoint touch pad	SRS 3D sound	$2979.63	89632
A70+	150MHz Pentium MMX	16MB/80MB	1.44GB	10X	12.1" active matrix	33.6K bps	SmartPoint touch pad	SRS 3D sound	$3075.78	86919
A70+	150MHz Pentium MMX	16MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	SmartPoint touch pad	SRS 3D sound	$3445.14	89633
P70	150MHz Pentium MMX	32MB/80MB	2.1GB	10X	12.1" active matrix	28.8K bps	SmartPoint touch pad	32-bit PCI bus	$3559.65	87580
P80	166MHz Pentium MMX	32MB/80MB	3GB	10X	12.1" active matrix	28.8K bps	SmartPoint touch pad	32-bit PCI bus	$3997.62	87629
Acer Texas Instruments										
Extensa 610CD	150MHz Pentium	16MB/64MB	1.4GB	10X	11.3" dual scan	—	touch pad	external floppy	$1964.87	88530
Extensa 610CDT	150MHz Pentium	16MB/64MB	1.4GB	10X	11.3" active matrix	—	touch pad	external floppy	$2549.84	88531
Extensa 660CD	166MHz Pentium MMX	16MB/80MB	1.35GB	10X	12.1" dual scan	—	touch pad	16-bit stereo sound	$2699.55	83363
Extensa 660CDT	166MHz Pentium MMX	16MB/80MB	2.1GB	10X	11.3" active matrix	—	touch pad	16-bit stereo sound	$3179.04	83364
TravelMate 7060	166MHz Pentium MMX	32MB/64MB	2GB	10X	12.1" active matrix	33.6K bps	touch pad	16-bit stereo sound	$4289.59	88471
TravelMate 7063NT	166MHz Pentium MMX	32MB/64MB	3GB	10X	12.1" active matrix	33.6K bps	touch pad	Windows NT V4.0	$4949.69	88472
TravelMate 6160	166MHz Pentium MMX	32MB/96MB	2.1GB	10X	12.1" active matrix	33.6K bps	track stick	external floppy	$4699.26	81406
Fujitsu LifeBook										
435Dx	133MHz Pentium MMX	16MB/80MB	1.3GB	10X	12.1" dual scan	—	touch pad	SVGA resolution	$1999.00	92945
555Tx	150MHz Pentium MMX	16MB/80MB	2GB	10X	12.1" active matrix	33.6K bps	GlidePoint touch pad	16-bit stereo sound	$3499.00	85008
565Tx	166MHz Pentium MMX	32MB/96MB	2GB	20X	12.1" active matrix	33.6K bps	GlidePoint touch pad	XGA resolution	$4299.00	92055
635Tx	133MHz Pentium MMX	16MB/80MB	2GB	16X	12.1" active matrix	33.6K bps	touch pad	16-bit stereo sound	$3199.00	92058
655Tx	150MHz Pentium MMX	16MB/80MB	1.3GB	8X	12.1" active matrix	33.6K bps	touch pad	external floppy	$3799.00	85013
656Tx	150MHz Pentium MMX	16MB/80MB	2GB	16X	12.1" active matrix	33.6K bps	touch pad	SVGA resolution	$4299.00	92061
Hitachi VisionBook										
4140	133MHz Pentium	16MB/128MB	1.4GB	10X	12.1" dual scan	33.6K bps	touch pad	16-bit stereo sound	$1799.00	91046
4150x	150MHz Pentium MMX	16MB/128MB	1.4GB	10X	12.1" dual scan	33.6K bps	touch pad	16-bit stereo sound	$2499.00	91047
4360x	166MHz Pentium MMX	16MB/128MB	2.1GB	10X	12.1" active matrix	33.6K bps	touch pad	SVGA resolution	$3499.00	91049
7340	133MHz Pentium MMX	16MB/144MB	1.4GB	10X	12.1" active matrix	56K bps	GlidePoint touch pad	16-bit stereo sound	$3199.00	91051
7360	166MHz Pentium MMX	32MB/144MB	2.1GB	10X	12.1" active matrix	56K bps	GlidePoint touch pad	16-bit stereo sound	$4499.00	91053
7560	166MHz Pentium MMX	32MB/144MB	3GB	10X	13.3" active matrix	56K bps	GlidePoint touch pad	XGA resolution	$4999.00	91054
8560	166MHz Pentium MMX	16MB/80MB	2.1GB	10X	13.3" active matrix	56K bps	GlidePoint touch pad	XGA resolution	$4799.00	91056
Hewlett-Packard OmniBook Notebook PCs										
800CT	166MHz Pentium MMX	16MB/80MB	2GB	—	10.4" active matrix	—	TrackPoint III track stick	external floppy	$3679.68	85727
5700CT	150MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$3597.52	85720
5700CT	166MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$4039.53	85721
5700CTX	166MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	—	TrackPoint III track stick	XGA resolution	$4098.82	85723
5700CTX	166MHz Pentium MMX	32MB/128MB	2.79GB	optional	12.1" active matrix	—	TrackPoint III track stick	XGA resolution	$4574.81	85722
Samsung Sens Pro										
521	133MHz Pentium	16MB/80MB	1.44GB	10X	12.1" active matrix	—	SensPad touch pad	16-bit stereo sound	$2349.27	88011
523	133MHz Pentium	32MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	SensPad touch pad	16-bit stereo sound	$2834.98	88008
525	150MHz Pentium MMX	48MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	SensPad touch pad	16-bit stereo sound	$3298.71	88002

TOSHIBA

Tecra 500CDT
120MHz Intel Pentium®
16MB EDO RAM standard, expandable to 144MB
1.26GB hard drive
6X CD-ROM drive interchangeable with standard 1.44MB floppy drive
12.1" active-matrix
SVGA color display
Integrated 28.8K bps data/fax/voice modem

$1995.94 CDW 70243

TOSHIBA

Satellite Pro 440CDT
133MHz Intel Pentium® MMX
16MB EDO RAM standard, expandable to 144MB
1.34GB hard drive
10X CD-ROM drive
12.1" active-matrix
SVGA color display
33.6K bps internal data/fax modem

$2799.55 CDW 90352

QUALITY EXPRESS SERVICE

One great plan.
One great price.

Only $269

Should you have a computer problem, simply make one TOLL-FREE CALL!

Call your CDW® account manager for details!

CDW® offers
FREE configuration
of your new notebook purchase and
toll-free
technical support
for life of your PC!

CDW COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.

800-761-4239 See our ad in the back

CDW®
Honored by PC Magazine as one of the

Top 100
Most Influential Companies in the computer industry, by PC

©1997 CDW® Computer Centers, Inc. PC Mag 10/7/97 PCM3228D www.cdw.com/pcq
CIRCLE 147 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductCirc

CDW® offers the perfect balance

Desktops

Model	Processor	Chassis	RAM std/max	Hard drive	CD-ROM	Video	Modem	Ethernet	OS	Features	Price	CDW
Compaq Deskpro 2000												
5133/1200	133MHz Pentium	desktop	16MB/128MB	1.2GB	optional	Cirrus Logic	—	—	Win V3.1/Win 95	Intelligent Manageability	$979.00	72608
5133/2500	133MHz Pentium	desktop	16MB/128MB	2.5GB	optional	Cirrus Logic	—	—	Win V3.1/Win 95	Intelligent Manageability	$1069.00	72613
5166X/2100	166MHz Pentium MMX	desktop	16MB/384MB	2.1GB	optional	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1199.00	92269
5166X/3200	166MHz Pentium MMX	desktop	16MB/384MB	3.2GB	optional	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1309.00	92838
5166X/3200	166MHz Pentium MMX	mini-tower	16MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1619.00	92839
5200X/2100	200MHz Pentium MMX	desktop	16MB/384MB	2.1GB	optional	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1389.00	92840
5200X/3200/CDS	200MHz Pentium MMX	mini-tower	32MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1769.00	92842
5200X/3200	200MHz Pentium MMX	desktop	32MB/384MB	3.2GB	optional	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1579.00	92841
5233X/3200/CDS	233MHz Pentium MMX	desktop	32MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1949.00	92843
6200/2500/CD	200MHz Pentium Pro	mini-tower	32MB/192MB	2.5GB	8X	Cirrus Logic	—	—	Win 95	Intelligent Manageability	$2199.00	72765
Compaq Deskpro 4000												
5133/1620	133MHz Pentium	desktop	16MB/256MB	1.62GB	optional	Cirrus Logic	—	10BT	Win V3.1/Win 95	Intelligent Manageability	$1199.00	72768
5133/1620/LS	133MHz Pentium	mini-tower	32MB/256MB	1.62GB	optional	Cirrus Logic	—	10BT	Win V3.1/Win 95	LS-120 drive	$1199.00	72780
5166X/2400	166MHz Pentium MMX	desktop	16MB/256MB	2.4GB	optional	S3 VIRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1389.00	92844
5166X/3200	166MHz Pentium MMX	desktop	32MB/256MB	3.2GB	optional	S3 VIRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1589.00	92845
5166X/3200/CDS	166MHz Pentium MMX	mini-tower	32MB/256MB	3.2GB	16X Max	S3 VIRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1799.00	92846
5200X/2400	200MHz Pentium MMX	desktop	32MB/256MB	2.4GB	optional	S3 VIRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1689.00	92847
5200X/3200	200MHz Pentium MMX	desktop	32MB/256MB	3.2GB	optional	S3 VIRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1750.00	92848
6200/2500/LS/CDS	200MHz Pentium Pro	desktop	32MB/256MB	2.5GB	8X	Cirrus Logic	—	10BT	Win NT V4.0	LS-120 drive	$2149.00	72779
6233X/2500/CDS	233MHz Pentium II	desktop	32MB/192MB	2.5GB	8X	Cirrus Logic	—	10BT	Win NT V4.0	Intelligent Manageability	$2319.00	88475
Compaq Deskpro 6000												
6200/4200/PDS	200MHz Pentium Pro	mini-tower	64MB/256MB	4.2GB	optional	Matrox Millennium	—	10BT	Win NT V4.0	PD-CD Drive	$3099.00	84271
6200/2150/CDS	200MHz Pentium Pro	desktop	32MB/256MB	2.15GB	8X	Matrox Millennium	—	10BT	Win NT V4.0	Ultra SCSI	$2459.00	72786
6200/4200/PDS	200MHz Pentium Pro	desktop	32MB/256MB	4.2GB	optional	Matrox Millennium	—	10BT	Win NT V4.0	PD-CD Drive	$2789.00	84268
6233X/2150/PDS	233MHz Pentium II	desktop	32MB/192MB	2.15GB	optional	Matrox Millennium	—	10BT	Win NT V4.0	PD-CD Drive	$2829.00	88473
6266X/4200/CDS	266MHz Pentium II	desktop	32MB/192MB	4.2GB	8X	Matrox Millennium	—	10BT	Win NT V4.0	Ultra SCSI	$3178.00	88474
Compaq Presario												
2120	150MHz processor with MediaGX	desktop	24MB/128MB	2GB	8X	MPEG full-motion playback	33.6K bps		Win 95	10-stage equalization	$999.00	88172
2200	180MHz processor with MediaGX	desktop	16MB/64MB	1.6GB	8X	MPEG full-motion playback	33.6K bps		Win 95	10-stage equalization	$799.00	92852
4504	200MHz Pentium	mini-tower	16MB/64MB	2.1GB	16X Max	64-bit PCI accelerated	33.6K bps	—	Win 95	JBL Pro stereo speakers	$999.00	90509
4814	233MHz Pentium MMX	mini-tower	32MB/256MB	6.5GB	24X Max	64-bit PCI accelerated	56K bps	—	Win 95	Creative Imagng	$2299.00	90512
4824	233MHz Pentium II	mini-tower	32MB/256MB	6.5GB	24X Max	64-bit PCI accelerated	56K bps	—	Win 95	Zip drive	$2299.00	90513
IBM Aptiva												
C3E	233 MHz Pentium MMX	mini-tower	32MB/64MB	4.2GB	16X Max	ATI 3D RAGE II	33.6K bps	—	Win 95	Intel Video Phone	$1939.95	90536
C3D	233 MHz Pentium MMX	mini-tower	32MB/64MB	4.2GB	8X DVD	ATI 3D RAGE II	33.6K bps	—	Win 95	Intel Video Phone	$2099.00	90535
S9C	200MHz Pentium MMX	mini-tower	32MB/64MB	4.2GB	16X Max	ATI 3D RAGE II	33.6K bps	—	Win 95	Space-saving design	$1939.95	83775
S3C	233MHz Pentium MMX	mini-tower	32MB/64MB	4.2GB	16X Max	ATI 3D RAGE II	33.6K bps	—	Win 95	Space-saving design	$2299.00	90537
S35	233MHz Pentium MMX	mini-tower	48MB/64MB	6.4GB	24X Max	ATI 3D RAGE II	33.6K bps	—	Win 95	Space-saving design	$2699.00	90538
IBM PC Series												
PC 300GL	133MHz Pentium	desktop	16MB/256MB	1.2GB	optional	Cirrus Logic 5446	—	—	Win 95	Two USB ports	$979.89	85191
PC 300GL	166MHz Pentium	desktop	16MB/256MB	1.2GB	optional	Cirrus Logic 5446	—	—	Win 95	Two USB ports	$999.63	85188
PC 300GL	166MHz Pentium	desktop	16MB/256MB	2.5GB	optional	Cirrus Logic 5446	—	—	Win 95	Two USB ports	$1109.10	85190
PC 300GL	166MHz Pentium	desktop	16MB/256MB	2.5GB	16X	Cirrus Logic 5446	—	—	Win 95	Two USB ports	$1368.58	85189
PC 300GL	166MHz Pentium MMX	desktop	32MB/256MB	2.5GB	optional	Cirrus Logic 5446	—	—	Win NT V4.0	Two USB ports	$1419.28	85405
PC 300XL	233MHz Pentium II	desktop	32MB/384MB	2.5GB	16X Max	S3 Trio64V2	—	—	Win NT V4.0	Two USB ports	$2298.14	86313
PC 300XL	233MHz Pentium II	desktop	32MB/384MB	2.5GB	optional	S3 Trio64V2	—	—	Win 95	Ultra SCSI	$1999.36	86314
PC 300XL	266MHz Pentium II	desktop	32MB/384MB	4.2GB	16X Max	S3 Trio64V2	—	—	Win NT V4.0	Two USB ports	$2659.12	86315
PC 300XL	296MHz Pentium II	desktop	32MB/384MB	4.3GB	16X Max	S3 Trio64V2	—	—	Win NT V4.0	Two USB ports	$2969.24	86316

AcerPower Network Ready
200MHz Intel Pentium® MMX
32MB RAM standard
2.1GB hard drive
Pre-installed 10BASE-T Ethernet card
$996.32 CDW 91867

HP Vectra 525CD
200MHz Intel Pentium® MMX
24MB EDO standard, expandable to 192MB
2.5GB EIDE hard drive
16X Max EIDE CD-ROM drive
$1588.65 CDW 84444

HPVectra VL 5 5/166
166MHz Intel Pentium® MMX
16MB RAM
2.5GB hard drive
8X CD-ROM drive
$1439.22 CDW 91121

Deskpro 2000 model 5133/1200
133MHz Intel Pentium®
16MB EDO RAM standard, expandable to 128MB
1.2MB EIDE hard drive
3-year limited warranty includes first year onsite
$979.00 CDW 72608

Presario 4504
200MHz Intel Pentium®
16MB SyncDRAM standard, expandable to 64MB
2.1GB EIDE hard drive
16X Max EIDE CD-ROM drive
56K bps internal data/fax/voice modem
1-year parts, 1-year labor warranty; first year onsite
$999.00 CDW 90509

Equium 5160D
166MHz Intel Pentium® MMX
32MB EDO RAM standard, expandable to 192MB
2.1GB hard drive
12X CD-ROM drive
10/100 Ethernet support
$1418.82 CDW 84248

All monitors shown sold separately

# of savings and selection.

Desktops

Model	Processor	Chassis	RAM std/max	Hard drive	CD-ROM	Video	Modem	Ethernet	OS	Features	Price	CDW
HP Vectra 500 Series												
525CD	133MHz Pentium	mini-tower	16MB/192MB	1.2GB	8X	S3 Trio64	—	—	Win 95	Microsoft Office 95 Pro	$999.49	76404
520	166MHz Pentium	desktop	16MB/256MB	1.2GB	optional	SiS 6205	—	—	Win 95	Three year warranty	$1039.25	84434
520MCx	166MHz Pentium	desktop	16MB/256MB	1.6GB	16X Max	SiS 6205	33.6K bps	—	Win 95	16-bit stereo sound	$1327.84	84438
525CD	166MHz Pentium	mini-tower	16MB/192MB	1.6GB	16X Max	SiS 6205	—	—	Win 95	MS Word and Publisher	$1234.78	84439
525CDT	166MHz Pentium MMX	mini-tower	16MB/192MB	2.5GB	16X Max	S3 Trio64	—	—	Win 95	Two USB ports	$1489.65	84440
525MCx	166MHz Pentium MMX	mini-tower	24MB/192MB	2.5GB	16X Max	S3 Trio64	33.6K bps	—	Win 95	16-bit stereo sound	$1549.65	84443
526CD	200MHz Pentium MMX	mini-tower	24MB/192MB	2.5GB	16X Max	S3 Trio64	—	—	Win 95	Two USB ports	$1588.65	84444
525MCx	200MHz Pentium MMX	mini-tower	32MB/192MB	3.8GB	16X Max	Matrox Millennium	33.6K bps	—	Win 95	16-bit stereo sound	$1936.78	84445
HP Vectra VE PC Series 3												
VE3 5/133	133MHz Pentium	desktop	16MB/192MB	1GB	optional	SiS 6205	—	—	Win V3.1/Win 95	64-bit PCI graphics	$1034.82	78238
VE3 5/133	133MHz Pentium	desktop	16MB/192MB	1.6GB	optional	SiS 6205	—	—	Win V3.1/Win 95	64-bit PCI graphics	$999.36	91103
VE3 5/166	166MHz Pentium	desktop	16MB/192MB	1.6GB	optional	SiS 6205	—	—	Win V3.1/Win 95	64-bit PCI graphics	$1038.97	91105
VE3 5/200	200MHz Pentium	desktop	16MB/192MB	1.6GB	optional	SiS 6205	—	—	Win V3.1/Win 95	64-bit PCI graphics	$1048.60	91107
HP Vectra VL PC Series 5												
VL5 5/166	166MHz Pentium	desktop	16MB/192MB	1.6GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1166.30	85717
VL5 5/166	166MHz Pentium MMX	desktop	16MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1377.09	91115
VL5 5/200	200MHz Pentium	desktop	32MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1449.80	86511
VL5 5/200	200MHz Pentium MMX	desktop	32MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1598.63	91119
VL5 5/233	233MHz Pentium MMX	desktop	16MB/192MB	2.5GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1598.12	91120
VL5 5/133	133MHz Pentium	mini-tower	16MB/192MB	1.6GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1218.44	86523
VL5 5/166	166MHz Pentium	mini-tower	16MB/192MB	2.5GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1229.50	86527
VL5 5/166	166MHz Pentium MMX	mini-tower	16MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1439.22	91121
VL5 5/166	166MHz Pentium	mini-tower	32MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1519.54	86421
VL5 5/200	200MHz Pentium	mini-tower	16MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1395.28	84733
VL5 5/233	233MHz Pentium MMX	mini-tower	32MB/192MB	4GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1869.76	91123
Toshiba												
Equium 5160D	166MHz Pentium MMX	desktop	32MB/192MB	2.07GB	12X	2MB ATI 3D RAGE II	—	10/100	Win 3.11/Win 95	USB ports, DMI 2.0	$1418.82	84248
Equium 5200D	200MHz Pentium MMX	desktop	32MB/192MB	2.38GB	12X	2MB ATI 3D RAGE II	—	10/100	Win 3.11/Win 95	USB ports, DMI 2.0	$1549.64	84249
Equium 6200D	200MHz Pentium Pro	desktop	32MB/128MB	2.95GB	12X	2MB S3 ViRGE 3D	—	10/100	Win NT V4.0	USB ports, DMI 2.0	$2118.60	84251
Equium 6200M	200MHz Pentium Pro	mini-tower	32MB/512MB	4.24GB	12X	2MB ATI 3D RAGE II+	—	10/100	Win NT V4.0	USB ports, DMI 2.0	$2479.47	84252
Equium 6260M	266MHz Pentium II	mini-tower	32MB/256MB	3.73	16X	4MB ATI 3D RAGE II+	—	10/100	Win NT V4.0	USB ports, DMI 2.0	$2569.07	93106
Infinia 7161	166MHz Pentium MMX	mini-tower	32MB/128MB	2.38GB	12X	2MB S3 ViRGE 3D	33.6K bps	—	Win 95	USB ports, SRS 3D sound	$1640.89	84559
Infinia 7201	200MHz Pentium MMX	mini-tower	32MB/128MB	3GB	12X	2MB S3 ViRGE 3D	33.6K bps	—	Win 95	remote control, TV/FM card	$1989.24	84560
AST Bravo												
LC 5166	166MHz Pentium	desktop	16MB/384MB	1.6GB	optional	ATI mach64 VT3	—	—	Win 95	Two USB ports	$1006.80	93286
LC 5166M	166MHz MMX Pentium	desktop	16MB/384MB	2GB	optional	ATI mach64 VT3	—	—	Win 95	Two USB ports	$1115.18	93288
LC 5200	200MHz Pentium	desktop	16MB/384MB	2GB	optional	ATI mach64 VT3	—	—	Win 95	Two USB ports	$1137.16	93289
MS 5166	166MHz Pentium	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1625.72	91032
MS 5166	166MHz Pentium	desktop	16MB/256MB	2GB	optional	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1245.78	91034
MS 5166	166MHz Pentium	desktop	32MB/256MB	2GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1487.38	91038
MS 5166M	166MHz MMX Pentium	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1514.09	89552
MS 5166M	166MHz MMX Pentium	desktop	32MB/256MB	2GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1619.97	89553
MS 2000C/95	200MHz Pentium	desktop	32MB/256MB	2GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1480.00	89546
MS 2000C/NT	200MHz Pentium	desktop	32MB/256MB	2GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1549.10	89547
MS 3000C/95	200MHz Pentium	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1487.38	89549
MS 3000C/NT	200MHz Pentium	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1586.83	89548
MS 3000C/95	200MHz Pentium	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1664.00	89550
MS 3000C/NT	200MHz Pentium	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1649.08	89551
MS 3000C/95	200MHz Pentium MMX	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1779.77	89573
MS 3000C/NT	200MHz Pentium MMX	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1879.98	89574
MS 3000C/95	200MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1696.60	91570
MS 3000C/NT	200MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1799.35	91569
MS-T 6200	200MHz Pentium Pro	mini-tower	32MB/128MB	2.5GB	8X	Matrox Millennium	—	—	Win NT V4.0	16-bit stereo sound	$1886.33	70068
LC 6233	233MHz Pentium II	mini-tower	32MB/384MB	2GB	optional	S3 Virge/DX 3D	—	—	Win 95	Two USB ports	$2000.33	89106
LC 6233	233MHz Pentium II	mini-tower	32MB/384MB	2GB	optional	S3 Virge/DX 3D	—	—	Win NT V4.0	Two USB ports	$2197.33	89107

IBM® PC 300XL
233MHz Intel Pentium® II
32MB EDO RAM standard
2.5GB EIDE hard drive
16X Max CD-ROM drive
1-year limited warranty;
3-year parts warranty
$1999.36 CDW 86314

IBM® PC300GL
166MHz Intel Pentium® MMX
16MB SyncDRAM standard,
expandable to 128MB
2.5GB hard drive
1-year onsite limited warranty;
3-year parts warranty
$1179.37 CDW 89298

All monitors shown sold separately

QUALITY EXPRESS SERVICE

One great plan.
One great price.
Only $269
Should you have a computer problem, simply make one TOLL-FREE CALL!
Call your CDW® account manager for details!

CDW is the #1 mail-order reseller of Compaq, Hewlett-Packard, IBM and Toshiba products

CDW COMPUTER DISCOUNT WAREHOUSE
The right price. The right advice.
800-761-4239 See our ad in the back

"Check out these hot buys"
Buy any computer and get a Symantec Norton Utilities and WW Norton AntiVirus for half-price!

$33.00

$34.09

©1997 CDW® Computer Centers, Inc. PC Mag 10/7/97 PCM3228F www.cdw.com/pcg
CIRCLE 150 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

BIG SCREENS

The market for larger monitors for home and business is exploding. We test 50 17-

When Karl Ferdinand Braun assembled the first cathode-ray tube 100 years ago using a 3-inch circular screen made from phosphor-coated mica, he was looking for a new way to measure alternating current. From that tiny beginning, CRT technology has transformed the way we view and use information. No CRT application has evolved as much as the computer monitor. And in recent years, there has been a quiet revolution on the desktop as monitors that are getting increasingly bigger, better, and less expensive push aside small-screen units.

The once-standard 14-inch tube is on its way out to pasture, according to Stanford Resources, a San Jose–based market research firm. Unit shipments to the PC market in the U.S. will slide from nearly 8 million in 1996 to less than 2 million in 1999. The slack is being taken up by the now-standard 15-inch models, plus 17-inch monitors that are coming on strong (see the accompanying chart "Growth of the Big Screen").

www.pcmag.com

How good is your monitor? Log on to the interactive version of "Big Screens, Low Prices," download the test patterns we used to evaluate these units, and test your own display.

And there's even bigger news about the bigger screens: a whole new size category. This year Hitachi began shipping a 19-inch CRT to computer-monitor makers. With a wide-angle deflection yoke, the tube is closer in depth to a 17-inch than to a 21-inch model, making it lighter and less expensive to manufacture.

As a result, the first 19-inch monitors are

TRENDING DOWNWARD

As sales have grown, prices for 17-inch monitors have dropped steadily. Here we show the average street price of the Editors' Choice–winning units in each of our annual roundups of 17-inch monitors.

LOW PRICES

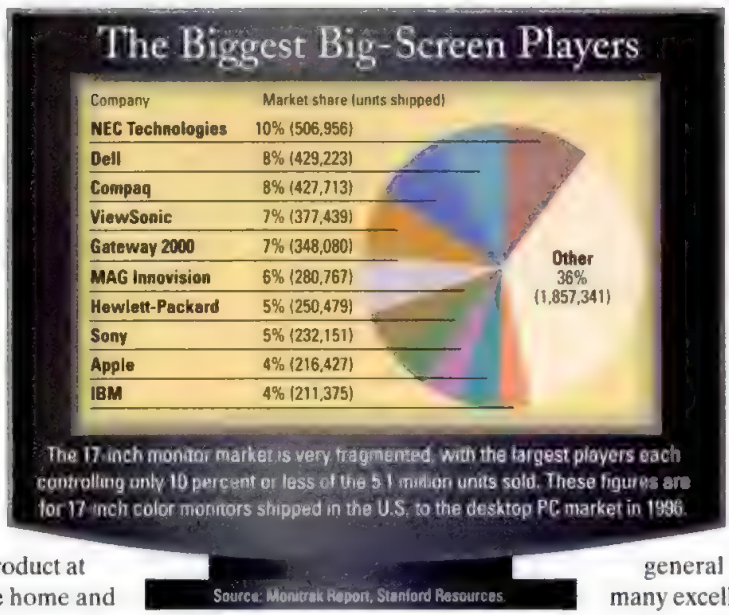
inch monitors as well as 7 of the brand-new 19-inch units. By Alfred Poor

PHOTOGRAPH BY SCOTT PETERSON

IN THIS REVIEW

17-inch monitors:
AcerView 76c 110
ADI MicroScan 5G 110
AOC Spectrum 7GIr 110
ArtMedia TN1885T 112
ATM Sylvania Precision S730A 112
Compaq V70 112
Continental DiGiview 1709D 112
CTX EX700, VL710 116
CyberVision ds86D 129
Daytek DT-1731D 129
Dell UltraScan 1000HS 129
Delta DB-770KA 129
EIZO Nanao FlexScan FX-C6, TX-C7 129
Gateway EV700 130
Hansol 700P 130
Hewlett-Packard UltraVGA 1280 131
Hyundai DeluxeScan 17B+ 131
IBM G72 134
iiyama VisionMaster Pro 17 135
KDS Visual Sensations VS-9 136
LG GoldStar StudioWorks 78D 137
MAG DJ707, DJ717 137
Mitsubishi Diamond Pro 87TXM 137
NEC MultiSync A700, E700 140
Nokia Multigraph 447Za 141
Optiquest V773 141
Panasonic PanaFlat PF70, PanaSync S70 141
Phillips 107B 142
PiXie PBC-7164 142
Princeton EO72 142
Sampo AlphaScan 750 142
Samsung SyncMaster 700b, 700p 144
Sceptre P75A 144
Shamrock C705T 144
Shinho AV2 765F 144
Smile CB6736SL 146
Sony Multiscan CPD-200SF, CPD-200SX, CPD-220VS 146
TeleVideo SVP260 SuperView Pro 146
Toshiba TekBright 700PM 148
Utobia XP400 148
ViewSonic G771, PT775 148
19-inch monitors:
Cornerstone Color 45/101sf 148
Gateway EV900 153
NSA/Hitachi SuperScan Elite 751 153
Phillips Brilliance 109 153
PiXie 995 156
Princeton EO90 156
Sampo AlphaScan 810 157
Editors' Choice 109
Monitor Market 110
How to Contact the Vendors 116
Performance Tests 118
Choosing a Monitor 121
Summary of Features 130

priced at around $700 to $1,000—only $200 above the 17-inch market and many hundreds less than 20- and 21-inch models. Because of the new yoke design, these monitors have a smaller footprint than one might expect: about 18 inches deep compared with 17.5 for a typical 17-inch monitor and 21 inches for a 21-inch monitor. These factors combine to make a monitor that's perfect for users who need the larger screens but can't afford the money or space such monitors formerly required, as well as for users who are ready to step up from the current 17-inch technology. Look for prices to fall as other tube manufacturers join Hitachi on the 19-inch bandwagon.



REVIEW CRITERIA

For this roundup we tested 50 17-and 7 19-inch monitors. We required the units to deliver 1,024-by-768 resolution at a minimum vertical refresh rate of 85 Hz, the current standard for ergonomic viewing endorsed by VESA (Video Electronics Standards Association).

Most monitor vendors have more than one 17-inch product at each screen size: *value* for the home and the budget-constrained user, *enterprise* (also called *business, corporate,* or *executive*) for the typical office application, and *professional* for high-end graphics and CAD applications. Most of the vendors chose to send a business-level model, though there were exceptions (noted in the reviews). We also invited some of the vendors with the largest market share to submit two or three models from their lineups. One large vendor, Apple, was between product cycles and did not have a unit ready in time for testing.

In the emerging 19-inch category, we tested all units that were available at the time of our testing. While only seven companies were able to answer the call in time, keep in mind that just about every major vendor has announced plans to offer at least one 19-inch model.

We assembled this tractor trailer–load of monitors at our test facility, where each one was subjected to careful scrutiny and rigorous testing. First, all the monitors were tested using SuperSpot CRT analysis equipment (by Microvision, Los Gatos, CA; 408-374-3158; *www.microvsn.com*). The system is designed to take highly accurate measurements of certain performance features, such as luminance (or brightness), misconvergence, and pincushioning (see "Performance Tests" for the test results and explanations).

Our team of reviewers examined each unit carefully for larger effects, including screen regulation, moiré patterns, color range, and screen geometry. For these tests, they used DisplayMate MultiMedia software, from Sonera Technologies, in Rumson, New Jersey (800-932-6323; *www.displaymate.com*). This Windows program provides a series of test images that you can use to try out optimal settings for your monitor. You simply choose a setting, then examine the test image at that setting for a wide variety of possible image-quality flaws. (You can download these test images and test your own monitor through the interactive online version of this story at *www.pcmag.com*).

NOW APPEARING ON THE BIG SCREEN

One of the big benefits of larger screens is that you can display more information. For example, the image on a typical 14-inch screen is about 10.4 inches wide. At 800-by-600 resolution, that works out to about 77 dots per inch. A typical 17-inch monitor has an image about 12.8 inches wide, which means that to get the same 77-dpi image, you can use a resolution of 1,024-by-768.

In everyday use, this translates into more information on-screen simultaneously. In fact, a 17-inch monitor provides 47-percent more screen real estate than a 14-inch model—and a 19-inch 84 percent more—so you can see more of a spreadsheet, word processing, or desktop publishing document, or more of a photo or CAD image at once, with less scrolling. This also lets you have more application windows open, so that you can jump from e-mail to the Web to your productivity apps a bit quicker.

At the same time that the monitors are getting bigger, they're also getting better. There wasn't a truly awful monitor in the entire group we tested. With only a few exceptions for some specific flaws, all of the monitors had at least acceptable image quality for general business applications, and many excelled.

But the best news of all is that the larger screens and better images cost less than ever. The price range for a 17-inch monitor in our roundup five years ago was $999 to $1,900. This year list prices range from $549 to $1,119, and five can be found on the street for $500—half the price of the least expensive unit five years ago

OF PHOSPHORS AND FEATURES

The biggest difference among current models is the type of CRT they use: Invar shadow mask, aperture grille, or slot mask (see the accompanying gatefold "The Essential Guide to Choosing a Monitor" for an explanation and diagram of each type).

Many users find that a standard shadow-mask screen works fine for them.

Our Contributors: ALFRED POOR and BRUCE BROWN are contributing editors of *PC Magazine.* STEVE BUEHLER is the Director of PC Labs, West Coast. JOHN BRYAN is a freelance writer. JAMIE M. BSALES was the associate editor in charge of this story, and JEFF MACE was the project leader.

Editors' Choice

- Corporate: Samsung SyncMaster 700b, Sony MultiScan CPD-200SX
- Professional: iiyama VisionMaster Pro 17

PC MAGAZINE EDITORS' CHOICE

We found the vast majority of the 57 monitors we tested to be quite acceptable, and more than a few stood out from crowd. We've chosen three models that stood out from the standouts. The Samsung SyncMaster 700b ($600 street) is priced for the value market, but the image quality from its 0.28-mm Invar shadow-mask tube makes it suitable for more than just budget-minded home and business users. You get image quality without compromises, suitable for any mainstream corporate or enterprise-class application.

If you're a mainstream business user who prefers the look and feel of an aperture-grille tube, consider the 0.25-mm Trinitron-equipped Sony MultiScan CPD-200SX ($650 street). We found the MultiScan flawless in our subjective evaluation.

For more demanding graphics, DTP, and professional imaging work, the winner in this roundup is iiyama's VisionMaster Pro 17 ($700). Equipped with a 0.25-mm aperture-grille tube (Mitsubishi's Diamondtron), the VisionMaster delivers the high resolutions and high refresh rates graphics pros will need.

HONORABLE MENTIONS

Look closely at the monitors listed below. All performed very well for their respective markets and merit an honorable mention. The number of cited units reflects how good the average product has become.

Value series: AcerView 76c ($500 street), CTX VL710 ($520 street), NEC MultiSync A700 ($649 list and street), Optiquest V773 ($550 street).

Corporate series: Compaq V70 ($699 direct), CTX EX700 ($550 street), KDS Visual Sensations VS-9 ($650 street), MAG InnoVision DJ707 ($600 street), NEC MultiSync E700 ($700 street), Nokia Multigraph 447Za ($649 list and street), Panasonic PanaSync S70 ($600 street), Princeton EO72 ($600 street), ViewSonic G771 ($620 street).

Professional series: ArtMedia TN1885T ($830 street), Dell UltraScan 1000HS ($749 direct), EIZO Nanao FlexScan FX-C6 ($960 street) and TX-C7 ($1,010 street), Mitsubishi Diamond Pro 87TXM ($800 street), Samsung SyncMaster 700p ($830 street), Sony MultiScan CPD-200SF ($750 street), Sony CPD-220VS ($900 street), ViewSonic PT775 ($850 street).

19-INCH NEWCOMERS

While we look forward to the evolution of monitors in the 19-inch arena, this first-generation tube from Hitachi is an adequate performer though not a standout. One 19-inch unit, however, the NSA/Hitachi SuperScan Elite 751 (about $1,000 street), distinguished itself from the others and deserves an honorable mention.

WINNERS The Samsung SyncMaster 700b, Sony Multiscan CPD-200SX, and iiyama VisionMaster Pro 17.

Some people prefer the low glare and deeper colors from the vertically flat aperture-grille designs (also called Trinitron and Diamondtron) found in 14 of the units we tested, while others find that they notice the faint shadows cast by the horizontal damping wires inside the tubes. Some people are attracted to the images produced by special models, such as those with NEC's CromaClear hybrid slot-mask tube (found here in the NEC MultiSync E700 and Smile CB6736SL).

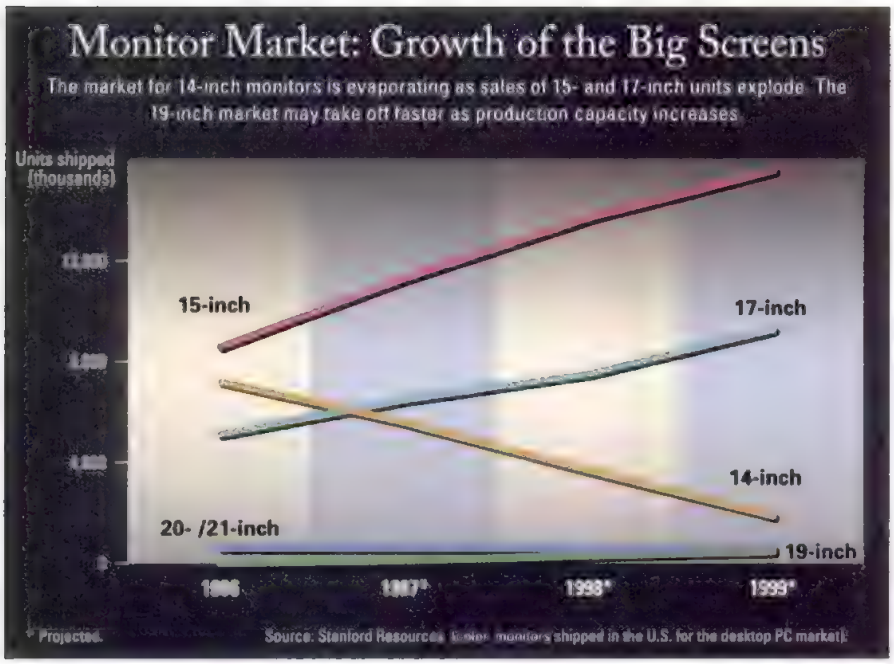
A notable debut this year is Panasonic's Pure Flat tube in the company's PanaFlat PF70. This revolutionary tube is flat in both the vertical and horizontal dimensions; shadow-mask tubes are slightly convex in both dimensions, while aperture-grille tubes are flat only in the vertical dimension. Which one works best for you is largely a matter of taste, all other factors being equal. Our testing revealed no persuasive objective criteria for choosing one over another.

Whichever technology you choose, consider the *phosphor pitch* carefully. This refers to the spacing between the dots (shadow mask), stripes (aperture grille), or ellipses (slot mask) of phosphor on the inside of the screen's face. This spacing defines the minimum width of a vertical white line that the monitor is capable of producing. The higher the resolution you want, the smaller the phosphor pitch you'll need.

All of the monitors use digital controls, making it easier to configure the monitors to work with different resolution signals. On-screen menus guide you through complex and advanced adjustments to fine-tune the image of your monitor; some even let you adjust the convergence or define your own color balance of red, green, and blue signals.

Seventeen of the monitors we reviewed have both standard D-sub VGA and coaxial BNC connectors in back. When used with the proper cable, the BNC connectors can transport the graphics signal more accurately than the standard VGA connector. These models provide a means of switching between the two different sources, which allows one monitor to serve two computers (say, a PC and a laptop) and lets you toggle between them.

PHOTOGRAPHS BY (MONITORS) THOM O'CONNOR; (SCREENS) © THE STOCK MARKET/GEORGE DIEBOLD



LINKS IN THE DAISY CHAIN

One special feature you may want to look for is USB (Universal Serial Bus) ports. USB ports let you daisy-chain multiple I/O devices on a single cable, providing high-speed access without the configuration hassles created by the current standard parallel and serial interfaces. These ports should let you plug mice, keyboards, modems, digital cameras, and other peripherals into your monitor, and even control the monitor's settings from your keyboard.

Note that to take advantage of USB you need a PC with a USB-compliant motherboard and a USB connector, plus a version of Windows that supports USB (namely, Windows 95 OEM Service Release 2.1 or later). The market has not yet had a chance to weigh in on the importance of USB, but with anticipated support built into the upcoming version of Windows and lots of announced USB peripherals, many users and manufacturers are betting on its success. Nine of the monitors here offer USB ports as an upgrade option ($20 to $130).

So while flashier technologies such as LCD monitors and full-color plasma panels are grabbing the headlines, the tried and true CRT is busy grabbing the dollars from buyers. CRTs remain your best bargain for desktop displays, and with the continuing parade of improvements and new features, you can expect this hundred-year-old technology to remain dominant for many years to come.

Our reviews will help you find the right monitor for your needs. You'll find the reviews of 17-inch models first, followed by the 19-inch models. At the top of each review we cite the unit's major specifications, including phosphor pitch, maximum recommended resolution (at an ergonomically comfortable refresh rate), and maximum resolution—though the lower refresh rate means that these top resolution modes should be used only occasionally, if at all.

17-Inch Monitors

AcerView 76c

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.27-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $500 street.*

Looking at its image quality and list of features, you might not guess that the AcerView 76c, from Acer America Corp., is one of the lowest-priced monitors in this group. Targeted at business and home PC users, the AcerView is a bargain.

The AcerView was not a performance standout, but it held its own against the competition. Scores on our Average MTF and Luminance Variance measures were excellent, and all other objective scores were acceptable. In eyes-on subjective evaluation, the AcerView had excellent uniformity, and color ramps were smooth. Our test unit had some small problems with misconvergence, however, and colors in the photographs were not as vivid as they were on some other monitors.

Setup is easy. The four-button front panel is straightforward, and the extensive on-screen menu system was one of the simpler to use in this roundup. Despite its low price, the AcerView comes with some unexpected extras. You can upgrade to a four-port USB hub for just $20, for example, and add side-mounted speakers ($15 for a 3-watt pair, $30 for 5 watts).

If you're looking for a bargain on a large screen for general office work or home use, the AcerView 76c is a good choice.—*Alfred Poor*

ADI MicroScan 5G

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,600-by-1,200 maximum recommended resolution (85-Hz refresh), 1,800-by-1,440 maximum resolution (60-Hz refresh). $750 street.*

Targeted at graphics professionals who need a high-bandwidth monitor for working at top resolutions, the ADI MicroScan 5G, from ADI Systems, hits its mark despite some uneven performance results. Its consistent luminance and clear text are sure to please its intended audience, although significant horizontal pincushioning might be frustrating to CAD users.

In subjective viewing, the MicroScan showed impressive resistance to streaking and ghosting, with excellent color tracking and good focus. This was borne out by a superior Average MTF score that bolstered a healthy if average MonMark result.

The MicroScan's on-screen controls deliver a full complement of user settings, including the convergence, moiré cancellation, and RGB adjustments that professionals need. Though it doesn't deliver the best-looking screen images we saw, the ADI MicroScan is still a respectable choice overall for graphics professionals.—*John Bryan*

AOC Spectrum 7GIr

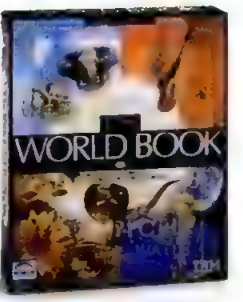
SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (75-Hz refresh). $600 street.*

The inexpensive AOC Spectrum 7GIr is designed to suit SOHO and home users in the market for an affordable display. Unfortunately, it doesn't rise above the crowd; there are other monitors in this

*Internet access required. World Book is a trademark of World Book, Inc. IBM is a trademark of International Business Machines Corporation in the U.S. and/or other countries. ©1997 IBM Corp. All rights reserved.

At least now they have a reason to think they know everything.

The 1998 World Book™ Multimedia Encyclopedia Deluxe Edition is perfect for those rare instances when your kids don't have an easy answer for everything. That's because the best way to motivate them is to give them something that makes learning enjoyable.



Keeping this in mind, we went and pumped up the multimedia (lots more audio, video and virtual reality), and added updated online capabilities* plus a powerful new homework "tool kit." All fully integrated with every article from World Book, the world's best-selling print encyclopedia.

For more information, drop by our Web site at www.pc.ibm.com/multimedia. Or call 1 800 426-7235, ext. 5217.

IBM

price range with better performance.

In subjective testing, on-screen images weren't as crisply focused as on other monitors, and we noticed some streaking and ghosting. It also did poorly on our screen-regulation test. On the plus side, its convergence was excellent at all four corners, and its color handling was fine. The Spectrum placed below average in terms of its MonMark score, though all the individual test results were acceptable or better. Its scores on the Average MTF, Misconvergence, and Luminance Variance measures were excellent.

Interesting features include dual power switches (front and rear), and a handy dial control for adjusting screen settings. While the low price makes the AOC Spectrum 7Glr enticing, all in all you can find better performance.—*JB*

ArtMedia TN1885T

SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,024-by-768 recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (60-Hz refresh). $830 street.*

Designed (and priced) for high-end graphics, CAD/CAM, and DTP professionals, the ArtMedia TN1885T has excellent performance that makes it stand out from the pack. We would have preferred to see better refresh rates at the ArtMedia's top resolutions, but the unit does provide all the features and stability that this market requires.

Particular strengths in subjective testing include crystal-clear photo images, precise geometry, and no screen halos. The ArtMedia showed excellent focus and clarity with text documents. It was also a top performer on our objective test suite, garnering one of the best MonMark scores in this roundup. Its scores on the Average MTF, Pincushioning, Luminance, and Luminance Variance tests were all in the excellent range.

While the unit can deliver 1,280-by-1,024 and 1,152-by-870 resolutions, it does so at an acceptable but not ideal 75-Hz refresh. Others in this class deliver higher rates in these modes. Still, the ArtMedia TN1885T is a top-flight performer.—*JB*

ATM Sylvania Precision S730A

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $630 street.*

Hoping to build a presence in the home PC market with a familiar (and fondly remembered) brand name, Advanced Technology Marketing has licensed the Sylvania moniker for its new line of mid-priced monitors. The Precision S730A generally trailed the field on both subjective and objective measures. It's an adequate performer for home gaming and other noncritical tasks, but you can get better image quality for the price.

The Sylvania showed good focus in subjective testing, though colors tended to be dull and flat. It also suffered from excessive screen-regulation problems. All its scores on our objective tests, however, were acceptable or better. Our unit came equipped with 5-watt speakers whose sound quality is somewhat thin. Volume is controlled through the on-screen display, which is not as convenient as having a separate control.

The Sylvania could be an acceptable monitor for undemanding use, especially for home applications like gaming. If you need a monitor for working long hours at home as well, look to a better performer.—*Steve Buehler*

COMPAQ V70 The Compaq V70 sports a clean back panel and a flip-down door to keep unsightly cables out of view.

Compaq V70

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $699 direct.*

Compaq Computer Corp.'s Compaq V70, an Editors' Choice winner in this roundup a year ago, still holds its own in objective and subjective testing against this current crop of 17-inch monitors. The V70 is aptly targeted as a mainstream corporate monitor. While it doesn't reach the highest performance levels demanded by graphics professional users, the V70 remains a good value for business users.

Color, focus, resolution, screen geometry, and particularly photo image quality were all first-rate on our subjective tests, in which the V70 placed midpack overall. There was noticeable pulsing in screen-regulation testing, however, and a noticeable change in the black-level shift test; both factors suggest that the Compaq isn't a competitive choice for applications where full-motion video or rapid graphics changes are used often.

Compaq's three-button arrangement for screen geometry controls is simple to use. In addition, a flip-up panel on the back neatly conceals all the unsightly cables, a clever touch ideal for open-office settings, reception areas—anywhere you would like the back of the monitor to look presentable.

While it may not be the best choice as a multimedia monitor, the Compaq V70 remains a solid buy for typical corporate business applications.—*Bruce Brown*

Continental DiGiview 1709D

SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (65-Hz refresh). $600 street.*

Buyers will be pleased to find that Continental Technology's DiGiview 7109D, intended for power users who work with demanding graphics and CAD applications, is one of the lowest-priced aperture-grille monitors in this roundup. Its average performance on our subjective and objective tests, bolstered by a below-average price, makes the DiGiview quite a deal.

The DiGiview's image quality was very good overall. Its geometry control, focus, color tracking, gray scale, and photo images were all excellent. There was, however, noticeable pulsing on the screen-regulation test, as well as some significant streaking and ghosting.

A one-touch on-screen display control menu system makes geometry adjustment

Is lack of support ending your infatuation with your current P.C.?

Well here's living proof customers just love Quantex.

Overall Rankings

PC Vendor	Grade
Quantex	Excellent
Dell	
Hewlett-Packard	
IBM	
Compaq	Good
Gateway 2000	
Micron	
NEC	
Acer	Fair
AST	
Toshiba	
AT&T	Poor
Digital	
Packard Bell	

Windows Magazine, 6/97

Would you buy again?

Vendor	% who would buy the same brand
Dell	92%
Quantex	91%
Hewlett-Packard	89%
IBM	89%
Micron	81%
Gateway	80%
Acer	74%
AST	74%
NEC	71%
AT&T	69%
Digital	69%
Toshiba	61%
Compaq	58%
Packard Bell	51%

Windows Magazine, 6/97

"Quantex, making its debut in the desktop category, quickly resolves its callers' problems an impressive 47 percent of the time, compared with the survey average of 31 percent."

PC Magazine 7/97

"★★★★" Buy again based on service and support

PC World 6/97

Good Choice.℠

Here's 2 more reasons to love

The competition can't measure up to our fastest system ever..

Our QP6/300 SM-4x has a mind-boggling 300 MHz Pentium® II Processor, just for starters. And an eye-opening 19" monitor to let you see all this speed in action. We follow this up with a huge 8GB Enhanced IDE hard drive to provide all the space you need. Then throw in Matrox's quickest video card with new AGP technology--the Millennium II with 4 MB of WRAM-- for a combination of speed, power and visual fireworks that can't be beat. All backed by Quantex's award winning service and support, including 24 x 7 tech support from living, breathing experts.

QP6/300 SM-4x — $3399
(featuring Pentium® II processor)

Business lease: $111/Mo.

- 300MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 2 Universal Serial Bus (USB) Ports
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- AGP Matrox Millennium II 3D w/4MB WRAM
- Upgrade to AGP Matrox Millennium II 3D w/8MB WRAM for only $99
- 19" Digital Monitor (18.1" viewable)
- K56flex™ protocol Fax/Modem w/Voice Mail and Speakerphone
- 24X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec Lansing ACS-45 Speakers w/subwoofer
- ATX Case
- 104-Key Keyboard With MS IntelliMouse
- MS Windows '95 With MS Plus
- Power Multimedia Software Bundle
- 3-year limited warranty, 24-hr./7-day Technical Support

QP6/233 SM-4x (featuring Pentium II processor) $2999
QP6/266 SM-4x (featuring Pentium II processor) $3149

Special Upgrade to DVD-ROM* & DVD Decoder for only $199 (for SM-4x)

* Upgrade from PQ (3-4X)

Power Multimedia Series

Standard Features ■ 2 Universal Serial Bus (USB) Ports ■ K56flex™ protocol Fax/Modem w/Voice Mail and Speakerphone ■ 24X Max EIDE CD-ROM Drive ■ Ensoniq 32-Bit Wavetable Sound Card ■ 104-Key Keyboard With MS IntelliMouse ■ MS Windows '95 With MS Plus ■ Power Multimedia Software Bundle ■ 3-year limited warranty, 24-hr./7-day Technical Support ■ Mid-Tower Case

QP5/233 SM-1 — $1799
(with MMX™ Technology)

Business lease: $63/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- 32MB EDO Memory / 512KB Secondary Cache
- 3.2GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D with 4MB
- 15" Digital Monitor (14.0" viewable)
- Altec Lansing ACS-90 Speakers

QP5/200 SM-1 (with MMX™ Technology).... $1699
QP6/233 SM-1x (featuring Pentium II processor) $1999
QP6/266 SM-1x (featuring Pentium II processor) $2149

QP6/233 SM-2x — $2249
(featuring Pentium® II processor)

Business lease: $78/Mo.

- 233MHz Pentium® II Processor
- 32MB EDO Memory / 512KB Secondary Cache
- 4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D with 4MB
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-90 Speakers
- Upgrade SM-2 to 64MB EDO RAM and 5.1GB HD for only $150

QP5/200 SM-2 (with MMX™ Technology)..... $1899
QP5/233 SM-2 (with MMX™ Technology)..... $2049
QP6/266 SM-2x (featuring Pentium II processor). $2399

QP6/266 SM-3x — $2699
(featuring Pentium® II processor)

Business lease: $95/Mo.

- 266MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB AGP Graphics Card with 4MB
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-45 Speakers w/subwoofer

QP6/233 SM-3x (featuring Pentium II processor) $2549
QP6/300 SM-3x (featuring Pentium II processor) $2999

Software Bundle

■ MS Office '97 S8E ■ MS Money '97 ■ Office Mate ■ Day Planner Pro ■ Power Business Plans ■ Form Designer Pro ■ Project Manager Pro ■ Labels Unlimited ■ Compton's Reference Collection ■ Dr. Solomons Anti-Virus ■ Windows 95 with MS Plus ■ One-month trial memberships to AOL, CompuServe and Prodigy

Upgrades ■ Panasonic PD/CD-Rom Drive w/ one 650MB PD cartridge $ 249 ■ Microsoft Natural Keyboard (upgrade from 104-keyboard) $ 39 ■ HP Deskjet 692C Printer (w/photo color kit) $ 299

© 1997 Quantex Microsystems, Inc. All Rights Reserved, 4008 Pierce Street, Somerset NJ08873. Sales Hours. M-F, 9 a.m. - 12 a.m. (ET) - Sat., 9 a.m. - 6 p.m. All desktop system sales are subject to Quantex's three-year limited warranty and terms and conditions of sale. The three-year limited warranty includes first year, parts and labor. Second and third years, parts only warranty. No on-site service is available outside of the continental USA. On-site service is provided at the sole discretion of Quantex. On-site service is provided by an independent third-party provider. For details on our warranty or money-back guarantee call or write us. Other peripherals such as printers, joysticks, etc., are covered by manufacturer's warranty. Software titles are subject to change and cannot be substituted. All prices and configurations are subject to change without notice or obligation and do not include

us. And never leave us.

MMX intel inside pentium II

Our new notebook. The toughest competition the top-rated notebook's ever had.

THE POINT AT WHICH YOUR NOTEBOOK MEETS YOUR DESKTOP.

Quantex is proud to say that we are one of the last to introduce a notebook. Why? Because, unlike our competition, we waited until we could combine Intel Mobile Module Architecture, a 13.3" XGA Active Matrix screen and a 3GB removable hard drive with all the latest technologies for maximum versatility and expandability in a notebook. Meridian H Series notebooks: they're the equal of the top performing desktops and backed with our acclaimed 24-hour 7-day live tech support. For further information check out our website: www.Quantex.com

Meridian H 1331 $4499

Business lease: $146/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module Architecture
- 13.3" XGA Active Matrix Display
- 64MB SDRAM (expandable to 144MB) / 512KB Pipelined Burst Cache
- 3GB HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA 33 6k Fax/Modem
- 20X Max Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows '95
- MS Office '97 SBE
- Carrying Case
- 24-hr./7-day Technical Support
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

- **13.3" XGA Active Matrix Display**
- **New! Intel 430 TX PCI Chipset**
- **USB and Fast IR Ports**
- **PCI Bus with 128-Bit Graphics Accelerator**
- **Intel Mobile Module (IMM) architecture**
- **233 MHz Pentium® Processor with MMX™ Technology**

Standard Features ■ 3.5" 1.44 Modular Floppy Drive ■ 20X Max Modular CD-ROM Drive ■ PCI Bus w/128-bit graphics accelerator ■ Integrated 16-bit Stereo Sound and Speakers ■ Touchpad ■ Smart Lithium Ion Battery ■ USB and Fast IR Ports

Meridian H Series

Meridian H 1211 $3499

Business lease: $114/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module Architecture
- 12.1" SVGA Active Matrix Display
- 32MB SDRAM (expandable to 144MB)/512KB Pipelined Burst Cache
- 2GB HD
- PCMCIA 33.6K Fax/Modem
- Windows 95
- Carrying Case

Meridian H 1330 $3999

Business lease: $130/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module Architecture
- 13.3" XGA Active Matrix Display
- 32MB SDRAM (expandable to 144MB)/512KB Pipelined Burst Cache
- 3GB HD
- PCMCIA 33.6K Fax/Modem
- Windows 95
- Carrying Case

SUPPORT POLICY

■ 30-day money back guarantee ■ One-year Parts and Labor limited warranty ■ 3 years limited warranty on CPU and Main Memory ■ 1-year Depot Repair ■ 1-year express Replacement limited warranty ■ 24-hr./7-day Toll Free Technical Support

OPTIONS ■ Mini-Docking Station....$199 ■ 2nd Lithium Ion Battery.....$199 ■ PCMCIA Network Adapter...$129 ■ PCMCIA 33.6k Fax Modem...$129 ■ Deluxe Carrying Case....$99

QUANTEX

GOOD CHOICE.℠

1.800.346.6572

www.quantex.com

shipping or sales tax. All returned items must have a conspicuous RMA number issued by Quantex and be in original packaging. 30-day money-back policy does not include return freight or original shipping/handling charges. Quantex is not responsible for errors in typography or photography. Pentium, MMX, Intel and the Intel Inside logo are registered trademarks of Intel. Microsoft, and Windows are registered trademarks of Microsoft Corporation. K56flex is a trademark of Lucent Technologies and Rockwell Int'l. All other company trademarks are tradenames of each respective company.

easy. Besides offering the standard functions, the controls let you adjust color temperature and RGB.

This monitor can function in a mixed PC/Macintosh environment, hooking to a Mac with an optional $20 adapter. If you're in the market for a good 17-inch monitor for a variety of applications but don't want to spend top dollar, the DiGiview 1709D presents a good balance of features and performance for the price.—*BB*

CTX VL710, EX700

VL710 SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (72-Hz refresh). $520 street.* EX700 SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,152-by-870 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (68-Hz refresh). $550 street.*

CTX International's two entries in this review are both price/performance leaders, good for a variety of applications.

The VL710, which is targeted as an entry-level business display, scored slightly above average in both subjective and objective testing. It had excellent focus and color handling, with much better than average image control during our demanding screen-regulation and black-level shift tests.

Our test unit showed minor misconvergence in the green/blue and red/blue pixel placement in the corners, but not enough to be noticeable in normal use. Its eight-button control panel is fairly intuitive to navigate, though not as simple as some of the one- or two-button designs we've seen.

The executive-series EX700 is intended for demanding high-end graphics and imaging applications. The model we tested had no discernible misconvergence and shared its brand-mate's tight screen-regulation, color-handling, and geometry controls. There was perceptible streaking, however, in the black/white fine-image test, which is designed to show streaks and ghosts. Besides having a tighter dot pitch compared with the VL710, the EX700 adds a BNC jack and convergence control.

Particularly when you consider their low prices, the CTX monitors are good buys for moderately high-performance general-purpose use.—*BB*

HOW TO CONTACT THE VENDORS

Acer America Corp., San Jose, CA; 800-733-2237, 408-432-6200; www.acer.com/acc. *Circle 441 on reader service card.*

ADI Systems Inc., San Jose, CA; 800-228-0530, 408-944-0100; www.adiusa.com. *Circle 442 on reader service card.*

AOC International (USA) Ltd., Milpitas, CA; 800-343-5773, 408-956-1070; www.aocltd.com. *Circle 443 on reader service card.*

ArtMedia USA, Santa Clara, CA; 800-278-6334, 408-980-8988; www.artmedia.com. *Circle 444 on reader service card.*

ATM (Advanced Technology Marketing), Edina, MN; 800-850-4939, 612-897-1830; www.osramsylvania.com. *Circle 445 on reader service card.*

Compaq Computer Corp., Houston, TX; 800-345-1518, 281-370-0670; www.compaq.com.

Continental Technology Inc., Edison, NJ; 888-225-8899, 626-854-8215; www.digiview.com. *Circle 447 on reader service card.*

Cornerstone Imaging Inc., San Jose, CA; 800-562-2552, 408-435-8900; www.corimage.com. *Circle 448 on reader service card.*

CTX International Inc., City of Industry, CA; 800-888-2120, 818-839-0500; www.ctxintl.com. *Circle 449 on reader service card.*

CyberVision, City of Industry, CA; 888-572-9237, 818-839-5557; www.cyberdisplay.com. *Circle 450 on reader service card.*

Daytek Electronics Corp., Carrollton, TX; 800-329-8351, 972-241-1700; www.daytek.com. *Circle 451 on reader service card.*

Dell Computer Corp., Round Rock, TX; 800-289-3355, 512-338-4400; www.dell.com. *Circle 452 on reader service card.*

Delta Products Corp., Fremont, CA; 800-959-3660, www.deltaca.com. *Circle 453 on reader service card.*

EIZO Nanao Technologies Inc., Cypress, CA; 800-800-5202, 562-431-5011; www.eizo.com. *Circle 454 on reader service card.*

Gateway 2000 Inc., North Sioux City, SD; 800-846-2000, 605-232-2000; www.gw2k.com. *Circle 455 on reader service card.*

Hansol MultiTech Inc., LaPalma, CA; 888-426-7651, 714-562-5151; www.hansol-us.com. *Circle 456 on reader service card.*

Hewlett-Packard Co., Palo Alto, CA; 800-322-4772, 415-857-1501; www.hp.com. *Circle 457 on reader service card.*

Hyundai Electronics America Inc., Monitor Division, San Jose, CA; 800-568-0060, 408-232-8662; www.hea.com. *Circle 458 on reader service card.*

IBM Corp., Somers, NY; 800-426-2968; www.pc.ibm.com. *Circle 459 on reader service card.*

Iiyama North America Inc., Costa Mesa, CA; 800-594-7480, 714-437-5111; www.iiyama.com. *Circle 460 on reader service card.*

KDS USA, Garden Grove, CA; 800-237-9988, 714-379-5599; www.kdsusa.com. *Circle 461 on reader service card.*

LG Electronics U.S.A. Inc., Englewood Cliffs, NJ; 800-243-0000, 201-816-2000; www.lgeus.com. *Circle 462 on reader service card.*

MAG InnoVision Co. Inc., Santa Ana, CA; 800-827-3998, 714-751-2008; www.maginnovision.com. *Circle 463 on reader service card.*

Mitsubishi Electronics America Inc., Cypress, CA; 800-843-2515, 714-220-2500; www.mitsubishi-display.com. *Circle 464 on reader service card.*

NEC Technologies Inc., Itasca, IL; 800-632-4636, 630-775-7900; www.nec.com. *Circle 465 on reader service card.*

Nokia Display Products Inc., Sausalito, CA; 800-296-6542, 415-331-4244; www.nokia.com. *Circle 466 on reader service card.*

NSA/Hitachi, Westwood, MA; 800-441-4832, 617-461-8300; www.nsa-hitachi.com. *Circle 467 on reader service card.*

Optiquest, Walnut, CA; 800-843-6784, 909-869-7976; www.optiquest.com. *Circle 468 on reader service card.*

Panasonic Computer Peripheral Co., Secaucus, NJ; 800-742-8086, 201-348-7000; www.panasonic.com/alive. *Circle 469 on reader service card.*

Philips Consumer Electronics Co., Atlanta, GA; 800-835-3506, 770-821-2400; www.philipsmonitors.com. *Circle 470 on reader service card.*

PiXie Technologies Inc., Fremont, CA; 800-440-7211, 510-440-9721; www.pixie.com. *Circle 471 on reader service card.*

Princeton Graphic Systems, Santa Ana, CA; 800-747-6249, 714-751-8405; www.prgr.com. *Circle 472 on reader service card.*

Sampo Technology Inc., Norcross, GA; 888-321-4100, 770-449-6220. *Circle 473 on reader service card.*

Samsung Electronics America Inc., Ridgefield Park, NJ; 800-933-4110, 201-229-4000; www.sosimple.com. *Circle 474 on reader service card.*

Sceptre Technologies Inc., City of Industry, CA; 800-788-2878, 626-369-3698; www.sceptretech.com. *Circle 475 on reader service card.*

Shamrock Peripherals Inc., Milpitas, CA; 888-801-8899, 408-934-9050; www.shamrockusa.com. *Circle 476 on reader service card.*

Shinho Electronics & Communications Inc., Cerritos, CA; 888-474-4646, 562-802-8116; www.shinhousa.com. *Circle 477 on reader service card.*

Smile International Inc., Costa Mesa, CA; 800-876-4532, 714-546-0336; www.smilekfc.com. *Circle 478 on reader service card.*

Sony Electronics Inc., San Jose, CA; 800-352-7669; www.sony.com/technology. *Circle 479 on reader service card.*

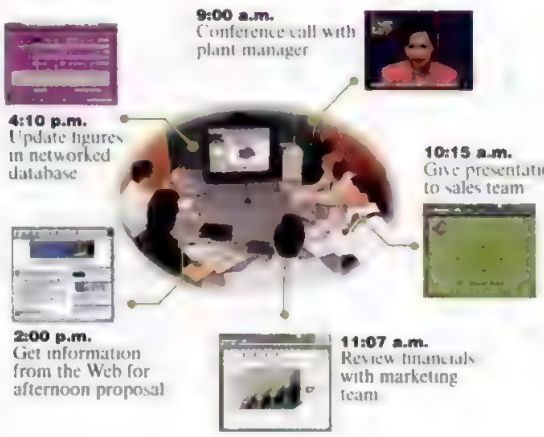
TeleVideo Inc., San Jose, CA; 800-835-3228, 408-954-8333; www.televideoinc.com. *Circle 480 on reader service card.*

Toshiba America Information Systems Inc., Irvine, CA; 800-334-3445, 714-583-3000; www.computers.toshiba.com. *Circle 481 on reader service card.*

Utobia Corp., City of Industry, CA; 888-488-6242, 818-855-5080; www.utobiadvd.com. *Circle 482 on reader service card.*

ViewSonic Corp., Walnut, CA; 800-888-8583, 909-869-7976; www.viewsonic.com. *Circle 483 on reader service card.*

©1997 Intel Corporation



Don't settle for a one-trick system.

Most group video conferencing systems do primarily one thing—video conferencing. Unless you're looking at Intel's TeamStation™ System.

TeamStation System is built around a Pentium® II processor-based PC. Now over the course of a day, your team can hold a video conference with a plant manager in the morning, review financials with the marketing team at midday, and get information from the Web for a proposal in the afternoon.

So call 800-538-3373, ext. 250 and ask about a demo. Or visit Intel on the World Wide Web for a look at a group video conferencing system that gives you more. ► www.intel.com/proshare/conferencing/demo

intel®

PERFORMANCE TESTS

17- and 19-Inch Monitors

The objective image quality of monitors has improved vastly over the past few years. On each of our tests, more than half of the units turned in scores that we deemed excellent. There were relatively few unacceptable individual results.

What the Numbers Mean

The overall **MonMark** score is a composite rating derived from the objective test measurements of each monitor. It is based on screen attributes most important to a business user.

To measure **Average MTF** (modulation transfer function), an indication of a monitor's overall sharpness, we display a pattern of fully green lines (to eliminate the effect of convergence error), 1 pixel wide, in both a horizontal and vertical direction. We report the average of the horizontal and vertical test results, measured both at the center and one corner of the screen. A score of 60 percent or above is excellent; none of the monitors in this group scored below 35 percent, which would be an unacceptable score.

Misconvergence occurs when the electron beams that excite the monitor's red, green, and blue phosphors are misaligned, creating color halos around screen objects. For the **Misconvergence** test, we measured the beam displacement between red, green, and blue pixels near each corner and at the center of the display in both a horizontal and vertical direction. We report the root mean square (RMS) of these results. A score of 0.10 mm or less is excellent; 0.20 mm or above is unacceptable.

Pincushioning is a measure of how much a straight line curves or bows on-screen. The **Horizontal Pincushioning** and **Vertical Pincushioning** tests measure the amount of curvature in the lines placed at the center and edges of the display. We used the monitor's controls to correct error as much as possible, and we report the RMS of the results. A score of 0.45 mm or less is considered excellent; 0.65 mm or more is noticeable to the eye and hence unacceptable.

Luminance is a standard measurement of the average perceived

▲ High scores are best.
▼ Low scores are best.
Green type = Excellent
Red type = Unacceptable
Bold italic type denotes first place within each category.

	Subjective Analysis Score ▲	MonMark Score ▲	Average MTF Percent ▲	Misconvergence Millimeters ▼	Horizontal Pincushioning Millimeters ▼	Vertical Pincushioning Millimeters ▼	Luminance Foot-lamberts ▲	Luminance Variance Percent ▼	Color Variance Percent ▼
17-INCH MONITORS									
AcerView 76c	77	158	**78**	0.12	0.58	**0.41**	24	6	10
ADI MicroScan 5G	78	164	**77**	0.12	**0.67**	0.59	27	5	10
AOC Spectrum 7GIr	67	163	**72**	**0.09**	**0.35**	0.47	28	5	11
ArtMedia TN1885T	86	194	**71**	0.11	**0.25**	**0.27**	35	2	17
ATM Sylvania Precision S730A	69	155	59	0.13	**0.41**	**0.42**	33	6	16
Compaq V70	82	165	51	**0.08**	**0.35**	0.50	39	7	9
Continental DiGiview 1709D	85	169	**70**	0.12	**0.42**	**0.26**	29	5	10
CTX VL710	86	177	**79**	**0.10**	**0.25**	0.49	34	6	11
CTX EX700	85	173	**84**	**0.10**	**0.28**	**0.30**	24	5	15
CyberVision ds86D	81	184	**71**	0.11	**0.30**	0.52	35	4	7
Daytek DT-1731D	67	160	49	0.11	**0.28**	**0.30**	26	4	13
Dell UltraScan 1000HS	90	187	**70**	**0.20**	**0.67**	**0.27**	34	2	11
Delta DB-770KA	76	173	**61**	0.13	**0.39**	**0.26**	29	3	11
EIZO Nanao FlexScan FX-C6	86	167	**82**	0.13	**0.83**	**0.30**	26	4	14
EIZO Nanao FlexScan TX-C7	81	183	**73**	0.12	0.47	**0.25**	34	4	7
Gateway EV700	80	147	47	0.14	0.64	0.53	35	6	16
Hansol 700P	78	153	57	0.14	**0.33**	0.46	31	7	12
Hewlett-Packard UltraVGA 1280	78	176	54	**0.10**	**0.32**	**0.44**	36	3	10
Hyundai DeluxScan 17B+	69	167	**60**	0.11	**0.33**	**0.43**	27	5	6
IBM G72	86	158	49	0.11	**0.41**	**0.32**	31	3	14
iiyama VisionMaster Pro 17	90	171	**73**	**0.09**	0.51	**0.25**	25	4	11
KDS Visual Sensations VS-9	74	190	**73**	**0.07**	**0.28**	**0.16**	38	6	16
LG GoldStar StudioWorks 78D	75	183	**78**	**0.08**	**0.74**	0.51	35	4	8
MAG DJ707	80	170	**67**	0.14	**0.23**	**0.33**	33	7	10
MAG DJ717	80	166	**65**	0.13	**0.34**	0.58	31	3	12
Mitsubishi Diamond Pro 87TXM	86	179	**69**	**0.09**	**0.88**	**0.24**	30	4	7
NEC MultiSync A700	82	173	**64**	**0.10**	**0.39**	**0.36**	37	4	12
NEC MultiSync E700	82	173	**88**	**0.09**	**0.27**	**0.43**	28	8	15
Nokia Multigraph 447Za	***91***	168	54	**0.07**	0.47	**0.67**	36	4	9

brightness of a monitor. For the **Luminance** test, we measured a unit's brightness at the center of an all-white screen. A higher score indicates that a unit can produce a brighter image without bringing the black areas to gray, which would lower sharpness and contrast. A score of 35 fL (foot-lamberts) or above is excellent; less than 18 fL is unacceptable.

Uniformity is a measure of how luminance and color vary across the display, and the **Color Variance** and **Luminance Variance** tests measure this variance. Less than 8 percent variability is excellent; 20 percent or more variability is unacceptable.

How We Tested

We obtained these results using a Microvision SuperSpot 200 and its built-in video generator card (a Quantum Data Model 801 GF-ISA) set to a resolution of 1,024-by-768 pixels at a vertical refresh rate of 85 Hz. To measure Luminance, Luminance Variance, and Color Variance, we used a Minolta Color Analyzer CA-100.

In addition to these objective tests, we performed a subjective analysis of screen attributes using PhotoCD images viewed in Adobe Photoshop, plus a range of test patterns produced by DisplayMate for Windows from Sonera Technologies (800-932-6323, 732-747-6886; *www.displaymate.com*). Each monitor's tally on these measures is reported as a **Subjective Analysis** score.

DisplayMate is a software utility designed to help end-users set up, tune, test, and evaluate their monitors. It includes extensive online advice for improving and optimizing a monitor's image quality.

For example, DisplayMate contains screens comprising text of various point sizes, so you can judge a monitor's *text handling*, especially at the edges of the screen. A range of test images also lets you gauge a monitor's *color handling*. Screens of solid primary colors will reveal any blooming (brighter or dimmer patches), while gradient bars show how well a monitor can distinguish subtle variations in color.

The patterns in DisplayMate's *focus* matrix, comprised of tight geometric images such as small cloverleaf patterns in various sizes, help reveal areas of poor focus on the screen. The *geometry* tests show how well a monitor reproduces perfect circles and squares. Circles in the test images should be perfectly round, not pulled into an oval shape at the screen edges. Squares should be perfectly square and entirely uniform. This screen is designed to reveal problems with a monitor's linearity.

Screen regulation is an indication of how well a monitor handles fast-changing images such as video. DisplayMate's screen-regulation test flashes a white square on and off in the center of the screen. The more the lines at the edges of the screen move or pulse, the worse the regulation. The *black-level shift* test indicates whether or not the monitor is capable of holding a steady black level, or whether changing the content of the image will cause black levels to turn gray.

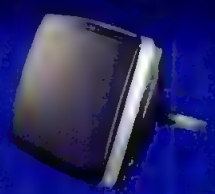
▲ High scores are best.
▼ Low scores are best.
Green type= Excellent
Red type= Unacceptable
Bold italic type denotes first place within each category.

	Subjective Analysis Score ▲	MonMark Score ▲	Average MTF Percent ▲	Misconvergence Millimeters ▼	Horizontal Pincushioning Millimeters ▼	Vertical Pincushioning Millimeters ▼	Luminance Foot-lamberts ▲	Luminance Variance Percent ▼	Color Variance Percent ▼
Optiquest V773	88	154	57	**0.09**	**0.68**	**0.43**	**35**	10	15
Panasonic PanaSync S70	89	168	**62**	**0.07**	**0.32**	**0.33**	31	**6**	13
Panasonic PanaFlat PF70	80	183	**66**	**0.09**	**0.28**	**0.28**	33	**6**	16
Philips 107B	75	167	50	**0.10**	**0.38**	**0.24**	**35**	**5**	9
PiXie PBC-7184	66	149	41	0.12	**0.37**	**0.30**	**41**	**5**	16
Princeton EO72	83	172	**65**	**0.07**	**0.97**	**0.30**	**45**	**6**	**28**
Sampo AlphaScan 750	75	174	**64**	0.12	**0.20**	**0.29**	30	8	**7**
Samsung SyncMaster 700b	89	171	**64**	**0.08**	**0.33**	0.48	**35**	**4**	14
Samsung SyncMaster 700p	90	***199***	**66**	**0.07**	**0.25**	**0.23**	**35**	**2**	12
Sceptre P75A	84	175	**71**	0.11	**0.43**	**0.40**	25	**3**	8
Shamrock C705T	72	166	**71**	**0.10**	0.56	**0.31**	33	**6**	16
Shinho AV2 765F	77	171	**79**	0.14	**0.45**	0.64	28	**3**	10
Smile CB6736SL	67	165	**84**	**0.08**	**0.40**	**0.40**	32	10	**20**
Sony Multiscan CPD-200SX	89	172	57	**0.08**	0.51	**0.35**	**35**	**4**	9
Sony Multiscan CPD-200SF	***91***	173	59	0.13	**0.37**	**0.40**	**37**	**3**	15
Sony Multiscan CPD-220VS	89	186	**73**	**0.08**	**0.44**	**0.23**	34	**4**	17
TeleVideo SVP260	83	181	**76**	**0.08**	**0.37**	**0.30**	30	**3**	8
Toshiba TekBright 700PM	88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Utobia XP400	85	177	**69**	0.13	**0.38**	**0.24**	31	**3**	11
ViewSonic G771	89	164	52	0.13	0.49	**0.23**	30	**4**	9
ViewSonic PT775	88	194	**69**	**0.05**	**0.29**	**0.17**	34	**4**	10
19-INCH MONITORS									
Cornerstone Color 45/101sf	71	170	**76**	**0.09**	**0.84**	**0.42**	29	**6**	**7**
Gateway EV900	69	168	57	**0.09**	**0.26**	**0.38**	27	**4**	9
NSA/Hitachi SuperScan Elite 751	***82***	183	**70**	**0.10**	**0.24**	0.61	33	**2**	16
Philips Brillance 109	72	162	**69**	0.16	**0.33**	0.59	28	**5**	9
PiXie 995	72	***184***	**62**	**0.22**	**0.13**	**0.24**	29	**4**	9
Princeton EO90	78	151	54	0.11	0.64	0.50	32	**4**	18
Sampo AlphaScan 810	77	159	**68**	**0.09**	**0.26**	**0.43**	27	**4**	13

N/A—Not applicable. Our automated test equipment was not compatible with the Toshiba monitor's proprietary software.

A breakthrough so visually advanced it leaves mere specs behind.

The MICROFILTER cathode ray tube is a brilliant breakthrough based on Toshiba's totally new approach to visual technology — relying far more on innovation than improved specifications. The result is a 30% increase in both brightness and contrast over our conventional CRTs. MICROFILTER utilizes original Toshiba technology — forming the micro-particulated material layer with primary color filters. Thus, shadow mask technology advances to a whole new level, surpassing even the aperture grill technique. Moving images are clear and bright; text is sharp and readable. In other words, MICROFILTER technology realizes the full visual potential of multimedia. Break through to a new level of brightness and contrast. The Toshiba MICROFILTER CRT.



microfilter CRT

More That Meets the Eye

http://www.toshiba.com/taec

In Touch with Tomorrow

TOSHIBA

CIRCLE 379 ON READER SERVICE CARD

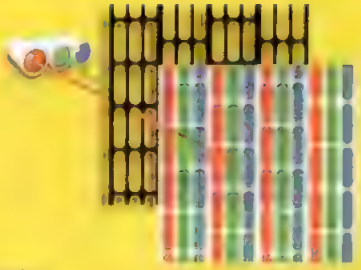
Toshiba America Electronic Components, Inc., Electron Tube and Device Division
One Pkwy., North, Suite 500, Deerfield, IL 60015, U.S.A. Tel: (847) 945-1500 Fax: (847) 945-1044

The Essential Guide to
CHOOSING A MONITOR

Buying a new monitor for your PC isn't easy. The burgeoning market for bigger-screen units—17- and 19-inch—has meant a flood of new manufacturers and models vying for your dollar. The good news is that there are more quality monitors to choose from, and they are getting more affordable all the time. This guide will get you started in your search, by helping you decide up front which tube type, screen size, specifications, and feature set to look for.

Competing Display Technologies

There are three types of CRTs (cathode-ray tubes) currently available, and each has its advantages for various applications. And if your budget allows, don't forget to consider the LCD (liquid crystal display) desktop option.

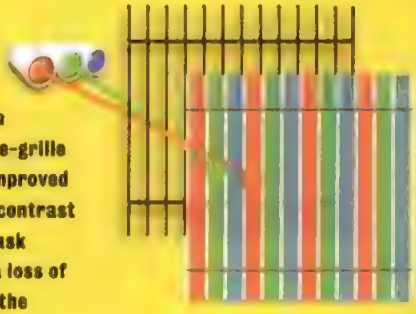


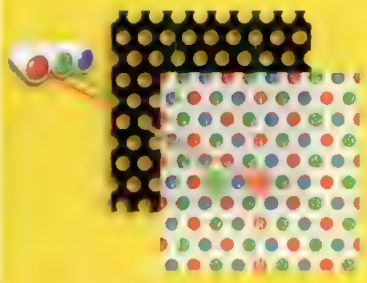
SLOT-MASK CRT

Monitor giant NEC invented this hybrid CRT, to which the company has given the name CromaClear, to combine the attributes of shadow-mask and aperture-grille designs. It uses a 0.25-mm mask with elliptically shaped phosphors. The company claims enhanced horizontal and vertical definition for better focus and greater sharpness, which bodes well for text-intensive applications.

APERTURE-GRILLE CRT

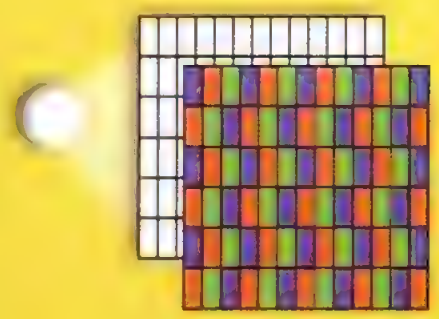
Aperture-grille CRTs (namely, Mitsubishi's DiamondTron and Sony's Trinitron) use an array of stretched wires to create images using phosphor lines. Look for a stripe pitch of 0.25 mm or less. Aperture-grille designs boast improved brightness and contrast over shadow-mask tubes, without a loss of focus. They are the better choice for image editing and other graphics-intensive work, though poorer horizontal definition makes them less suited to displaying text.





DOT-TRIO SHADOW-MASK CRT

The most common type of monitor tube uses a thin sheet of perforated metal in front of the CRT to create discrete phosphor dots. Look for a dot pitch—the shortest distance between phosphor dots of the same color—of 0.27 mm or less. Because of the way phosphor dots are arranged in shadow-mask monitors, these tubes deliver clean edges and sharp diagonals, which is important for text reproduction.



LCD PANEL

In an LCD panel, a thin layer of material transmits or blocks light; with this material arranged in an array of tiny cells, each pixel in an image can be turned on or off as required. LCDs deliver rock-solid images with no flicker and give off much lower amounts of VLF (very low frequency) and ELF (extremely low frequency) emissions. They also take up much less room. Cost is the prohibitive factor: At $2,000 to $3,000, a 14-inch LCD monitor is eight times as expensive as a similar 15-inch CRT monitor.

ILLUSTRATIONS BY JOE SKI AND JACK HARRIS/VISUAL LOGIC

Check Your RAM

If you're trading up to a larger monitor, you need to be sure your graphics accelerator has enough horsepower to support the higher-resolution modes. The figures below are the minimum graphics RAM you'll need for each resolution and color depth.

Resolution	16 colors (4-bit)	256 colors (8-bit)	65,000 colors (high color or 16-bit)	16.7 million colors (true color or 24-bit)
640 x 480	512K	512K	1MB	2MB
800 x 600	512K	1MB	2MB	2MB
1,024 x 768	1MB	1MB	2MB	4MB
1,152 x 870	1MB	2MB	2MB	4MB
1,280 x 1,024	1MB	2MB	4MB	4MB
1,600 x 1,200	2MB	2MB	4MB	8MB

Flicker tends to disappear when the vertical refresh rate hits between 70 and 75 Hz. The Video Electronics Standards Association (VESA) recommends 85 Hz for a satisfactory image. But why not run your monitor at the fastest refresh rate possible?

The answer is that you may be trading away image quality unnecessarily. To make a black and a white pixel next to each other, the electron beams in the monitor must go from off to on in an incredibly short length of time. If there isn't enough time for the change, the transition between the two pixels goes gray. If you are speeding up the refresh rate, you are giving the electron beams less time to switch on or off between pixels.

So the best approach is to choose the lowest refresh rate at which you can't see any flicker. To check, look about 6 inches to the side of the monitor while a white screen is displayed.—*Alfred Poor*

Back

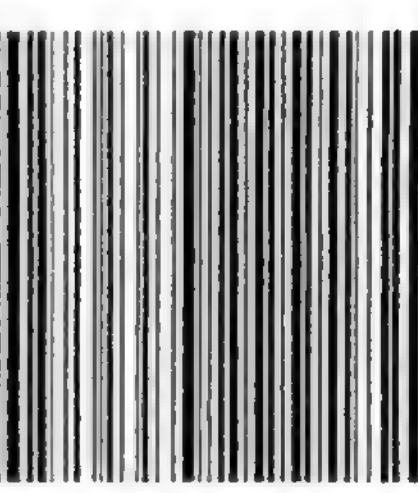
1. Follow instructions on the other side

Inverted Back

1. Follow instructions on the other side

Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Folded edge of the page

GbsSlipSheet-001

Foldout slip-sheet

FEATURE SET: THE BELLS AND WHISTLES TO LOOK FOR

SPEAKERS
If you need speakers just for business audio, the ones in multimedia monitors should suffice, and they save you valuable desk space.

Graphic artists will want color-matching software (such as Sonnetech's Colorific) to match printer output to screen images.

A good 17-inch monitor will have a viewable diagonal of 16 inches.

Look for a monitor that has (or lets you add) a Universal Serial Bus port for connecting USB peripherals.

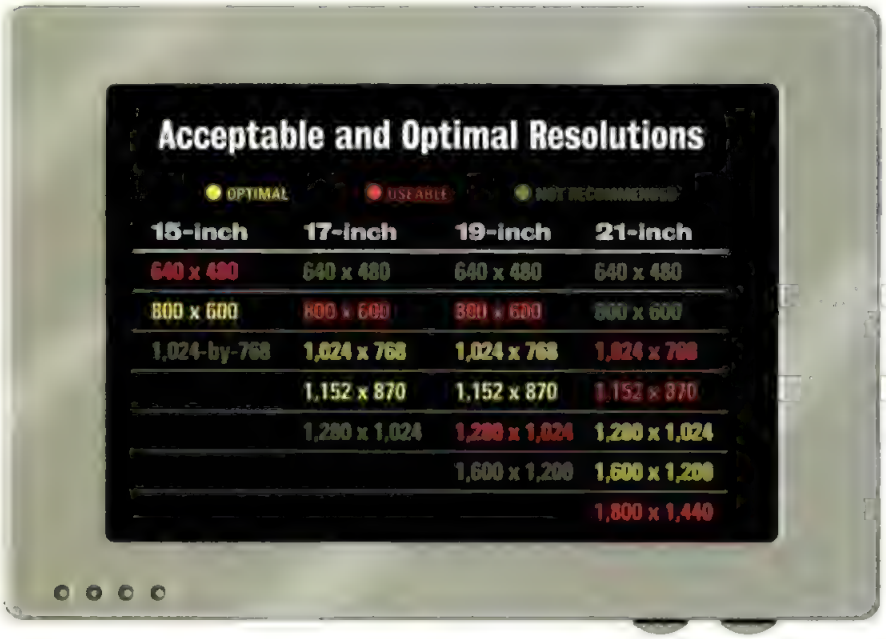
CONTROLS
Look for easy-to-use display controls. Advanced users will need controls in order to correct convergence and pincushioning at each edge.

Is Higher Refresh Always Better?

"Fight flicker; raise your refresh rate!" But wait—you *can* have too much of a good thing. There is a point where your *refresh rate*—the rate at which the screen is completely redrawn—can be too fast.

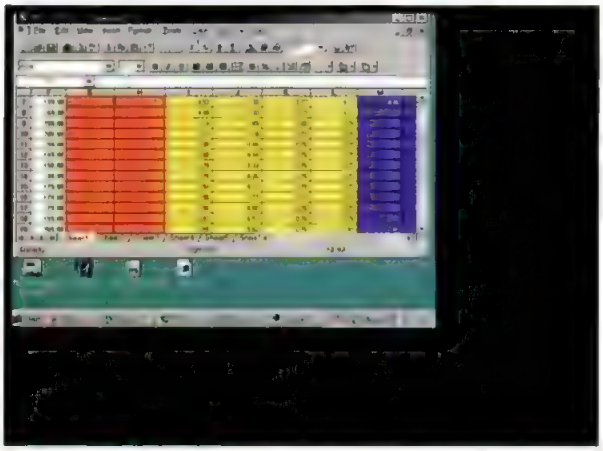
Flicker is a natural by-product of CRT technology. An electron beam paints phosphors with electrons, and the phosphors emit light. We want the phosphors to keep glowing until the electron beam gets back around to paint them again, but we don't want them to glow too long or they'll make the image too slow to keep up with changes (such as moving cursors or video images). So the solution is to use phosphors that don't glow very long, and then to repaint them very quickly.

The problem is that there is no fixed rate for a flicker-free display. Some people are more sensitive to flicker than others. Also, with the move toward larger screens, more of the monitor's image fills our field of view, so we see more of the screen with our peripheral vision. Whether it was an adaptation to aid in hunting or to avoid becoming dinner ourselves, human eyesight is more sensitive to motion in peripheral vision than in the center of our field of view, so we are more prone to see flicker on larger screens.

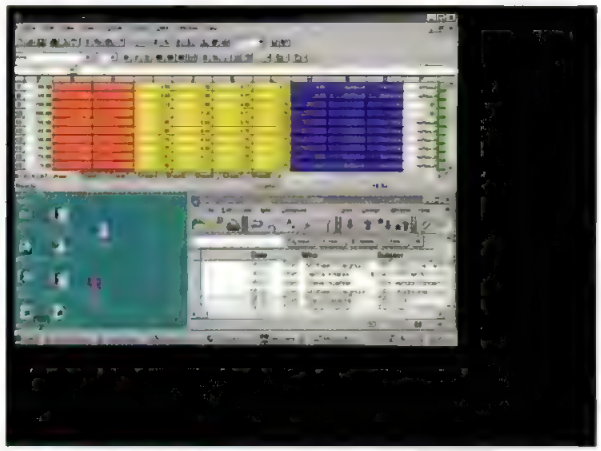


How Much Better Is Bigger?

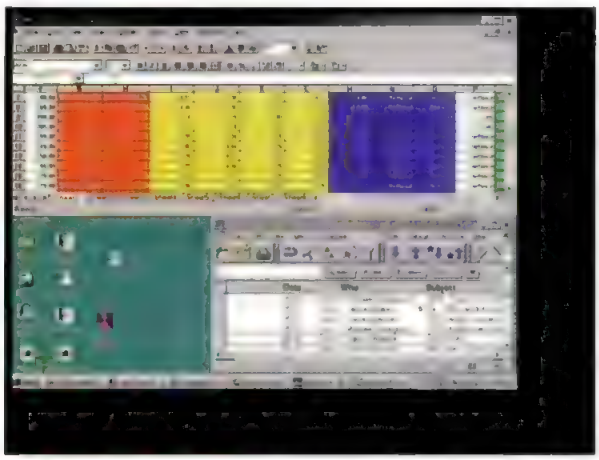
A larger screen will let you see more of a single document or have more windows open at once, which can increase productivity. And it's not just the physical screen area: A bigger screen enables you to work comfortably at a higher resolution and fit even more on-screen. These images show a typical desktop workspace as displayed on 15-, 17-, 19-, and 21-inch monitors. The table on the left lists both the usable and optimal resolutions for each screen size.



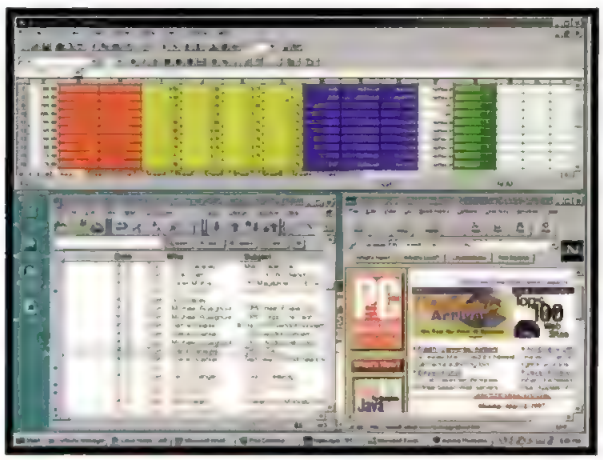
15-INCH: 800-BY-600 A 15-inch monitor is now the norm when you purchase a new system. It's good enough for a home PC that sees occasional use, or in a business environment where computer work is just a part of the day's chores. *Typical street price: $300 to $400.*



17-INCH: 1,024-BY-768 If you spend your working day at a PC, a 17-inch monitor is a real productivity enhancer. You'll spend less time scrolling and be able to have two applications visible. And it's affordable enough for home users. *Typical street price: $550 to $750.*

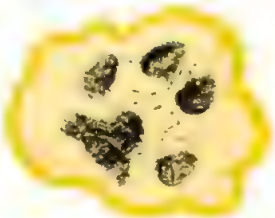


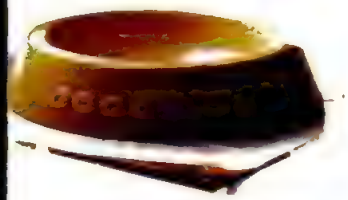
19-INCH: 1,024-BY-768 A 19-inch unit gives DTP professionals, graphic artists, and spreadsheet jockeys 25 percent more screen real estate than a 17-inch, in the same footprint, and for a lot less money than a 21-inch monitor. *Typical street price: $850 to $1,000.*



21-INCH: 1,280-BY-1,024 Because of its size and cost, a 21-inch model is not for everyone. The new 19-inch models will steal power users looking to move up, leaving this unit the province of image editors and CAD professionals. *Typical street price: $1,200 to $1,800.*

Christian Murphy was non-verbal. He lived with a wall between himself and the world.





2 A TEACHER DISCOVERED *that Christian would respond to images from his life. She put visual cues to the story of his new puppy on a special keyboard.*

3 THE MONITOR BECAME HIS VOICE. *With it he makes class reports and conversation. With it, Christian, 11, has been in the regular Osterville, MA public school since first grade.*

4 WITH THE PICTURES, HE MADE SENTENCES. *With the sentences, he made friends. Christian's monitor is the window between his non-verbal world and the speaking world of his friends. Through it, he teaches them many things.*

NEC MultiSync Monitors
E and A Series

THE MONITORS THAT ARE BEST FOR CHRISTIAN'S NEEDS *can also speak to yours. Introducing the NEC MultiSync® Enterprise and Advanced Series, the monitors for people looking for superior, lifelike images. And the monitors for people who want the kind of flexibility that super high resolutions and refresh rates ensure.*

OSM™ (On-Screen Manager) controls make image adjustments easy. Plus, select Enterprise monitors feature CromaClear™ CRT, for unparalleled focus, contrast and intense color saturation. And, of course, the industry-leading NEC warranty includes 3 years parts, labor and CRT.

For more information on the new performance-driven MultiSync Enterprise and value-oriented Advanced Series call 1-800-NEC-INFO or visit www.nec.com

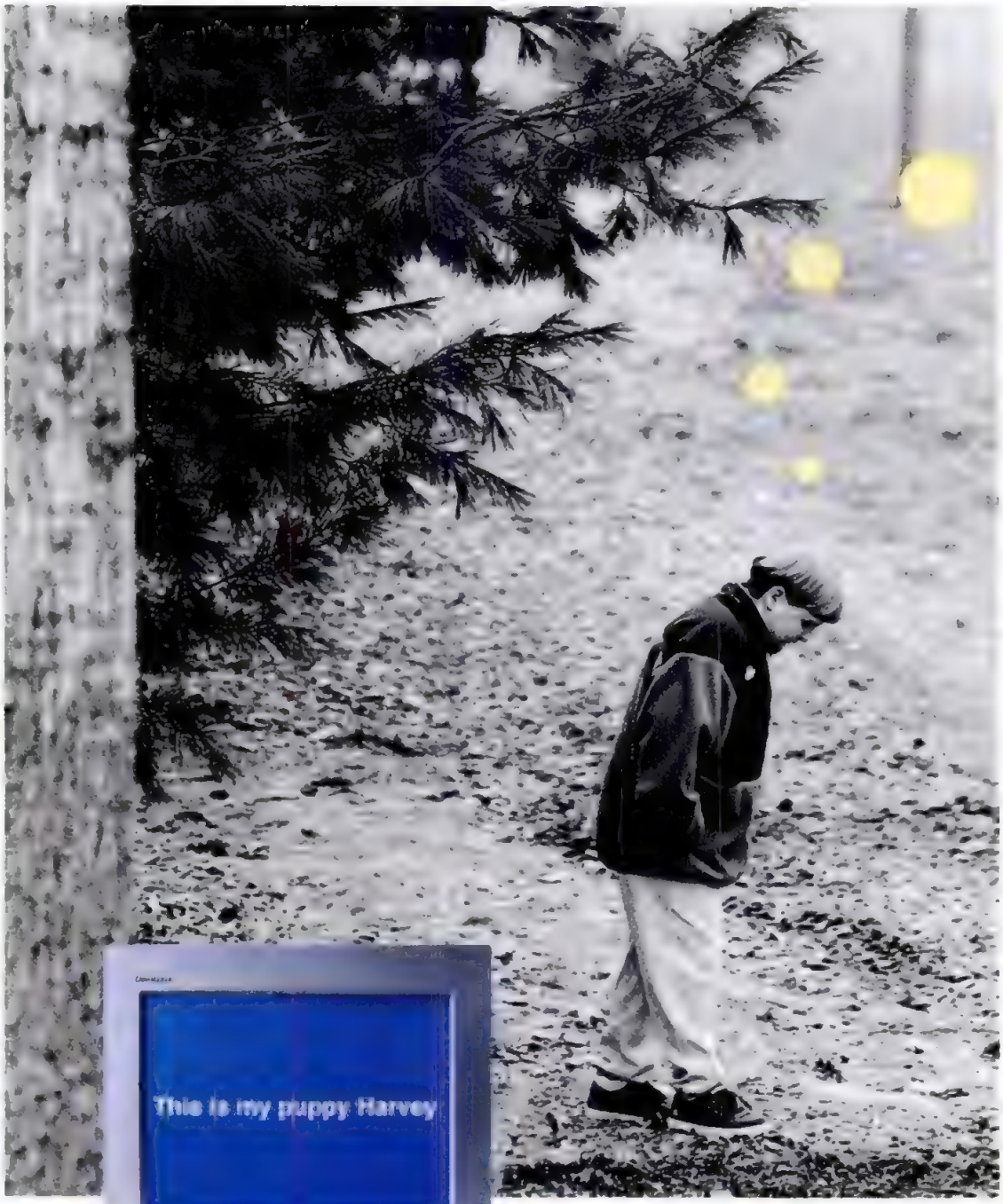
MULTISYNC® MONITORS

	Max Res	Bandwidth	CRT Type	Pitch
A500	1280 x 1024 @ 60Hz	112MHz	Dot Trio	0.28mm dot
A700	1280 x 1024 @ 65Hz	119MHz	Dot Trio	0.28mm dot
E500	1280 x 1024 @ 65Hz	119MHz	CROMACLEAR	0.25mm mask
E700	1600 x 1200 @ 65Hz	177MHz	CROMACLEAR	0.25mm mask
E1100	1600 x 1200 @ 65Hz	177MHz	Dot Trio	0.28mm dot

Expect more. Experience more.

NEC

MultiSync is a registered trademark and A500, A700, F500, F700, E1100, ChromaClear and "Expect more. Experience more." mark and icon are trademarks of NEC Technologies, Inc. All other trademarks or registered trademarks are the property of their respective holders. ©1997 NEC Technologies, Inc.



1 THIS IS CHRISTIAN

He can see, hear, feel, touch, but he cannot speak. He was born with autistic tendencies that cut him off from the world around him.

Until he found this window.

1 IN A FREE MARKET ECONOMY, *companies are always competing for capital. In fact, the market has never been more competitive than it is today. This increases the number of specialists needed to trade stocks. It also puts an additional burden on the technology needed to support them.*

Perhaps the first instance where computers are being replaced by people.

2 THE TRADING FLOOR *is crowded with specialists. The trading floor is also crowded with big, bulky CRTs that hog energy, take up precious room and throw off a lot of heat. (Besides, as any trader will quickly tell you, it's already 'hot' enough on the trading floor.)*

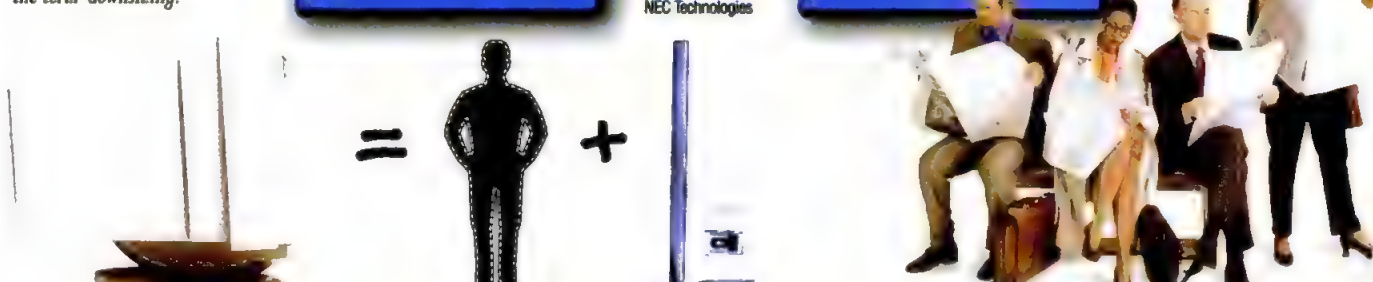
3 REPLACING A BIG, BULKY CRT *with a slim flat panel display actually makes room for more traders on the floor. Which is a good thing, since the trading volume on the major exchanges is higher than ever.*

MultiSync LCD Monitor Series		
	LCD2000™	LCD400™
Viewable Size	20.1"	14.1"
Maximum Resolution	1280x1024	1024x768
Weight	22.0 lbs	11.5 lbs
Dimensions (W, H, D)	19.7x19x8.7"	14.1x14.3x6.7"
Brightness	150 cd/m²	180 cd/m²
Viewing Angle	160° conical XtraView technology	160° conical XtraView technology
LCD Type	Active Matrix	Active Matrix

Both models are compatible with PC, Mac, workstation or any VESA compliant analog RGB signal, no special card required

4 MORE TRADERS MEANS MORE TRADES, *which means more money. (And let's be completely frank, shall we, what financial person doesn't like news like that?) In fact, one could even argue that migrating from big, bulky CRTs to slim flat panel monitors like the MultiSync LCD2000 could actually put a positive spin on the term 'downsizing.'*

NEC
NEC Technologies



MultiSync is a registered trademark and LCD2000, LCD400, XtraView, "Expect more. Experience more." and the NEC Technologies icon are trademarks of NEC Technologies, Inc. All other trademarks or registered trademarks are the property of their respective holders. ©1997 NEC Technologies, Inc.

CIRCLE 157 ON READER SERVICE CARD

CyberVision ds86D

SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,024-by-768 recommended resolution (101-Hz refresh), 1,600-by-1,200 maximum resolution (66-Hz refresh). $700 street.*

The CyberVision ds86D is a feature-rich monitor targeted at graphics professionals. It's a solid performer overall and a good value, though small image imperfections on our test unit kept it from leading the pack.

For example, our test photo images had a slightly red tone that we could not fully correct with the user controls. In its favor, the CyberVision scored above-average on our MonMark test suite, with strong performance on the Average MTF, Luminance, and Pincushioning tests.

Noteworthy features include particularly good user documentation and one of the most complete sets of on-screen controls in this roundup. If you're looking for a competent, affordable display to use in a high-end graphics environment, the CyberVision should serve you well.—*BB*

Daytek DT-1731D

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $500 street.*

With a limited set of resolution options and disappointing scores on our tests, the Daytek DT-1731D, from Daytek Electronics, lagged behind in this roundup. Although the Daytek is intended for budget-conscious buyers, better displays are available for just a little more money.

In subjective evaluation, the Daytek's focus and color handling were not as good as those of most other units we tested, and our test model showed startling instability on screen-regulation test. It also fell behind on our objective tests, posting a below-average MonMark score, but did well on our Luminance Variance measure, and its Horizontal and Vertical Pincushioning scores were excellent.

Users looking for a rich feature set and good image quality, however, may want to consider other monitors.—*JB*

Dell UltraScan 1000HS

SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,152-by-870 maximum recommended resolution (93-Hz refresh), 1,600-by-1,200 maximum resolution (67-Hz refresh). $749 direct.*

The Dell UltraScan 1000HS is sold as a high-end accompaniment to a new Dell PC for graphics professionals and power users. Our test results show that it is up to the task, performing well on most of our measures.

In subjective testing, the UltraScan was a standout. It showed excellent focus, as well as fine handling of text and color. It also performed handily on most of our objective tests, garnering a top MonMark score. Its Misconvergence and Horizontal Pincushioning results, however, were subpar, though we didn't notice any problems in the subjective evaluation.

One frustrating feature is the impatience of the on-screen display controls. If you don't input instructions within 10 seconds of turning a control on, it closes automatically. Still, the UltraScan delivers excellent value for a wide range of users.—*JB*

Delta DB-770KA

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh rate). $550 street.*

Designed for general-purpose business and SOHO users, Delta Products' DB-770KA is an average performer at a bargain price. As such, it's an attractive option for value-minded consumers.

The Delta was a solid if not stellar performer. Geometry, focus, text- and color handling were fine on our subjective tests, and we noticed no misconvergence problems. It placed squarely in the middle of the pack on our MonMark test suite.

Configuration control options are limited, though that can be forgiven for the price. But the manual, unfortunately, was nearly incomprehensible; it could be vastly improved with a minimum of effort. Although this monitor lacks some of the snazzy add-ons of others in this roundup, its acceptable image quality and low price make it a nice value.—*JB*

EIZO Nanao FlexScan FX-C6, TX-C7

FLEXSCAN FX-C6 SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,152-by-870 maximum recommended resolution (95-Hz refresh), 1,280-by-1,024 maximum resolution (80-Hz refresh). $960 street.*

FLEXSCAN TX-C7 SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,280-by-1,024 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (73-Hz refresh). $1,010 street.*

Peas in a pod, the EIZO Nanao FlexScan FX-C6 and TX-C6 have nearly identical features. The difference is that FX-C6 is based on an Invar shadow-mask tube; the TX-C7, which has a Diamondtron aperture-grille tube, delivers higher resolutions and scan rates. Both monitors are intended for business and professional graphics/CAD use.

Both were excellent on our screen-regulation and Luminance Variance tests, and both produced sharp photographic images with saturated colors. The FX-C6 scored a bit better overall on the subjective ratings, with especially strong focus and misconvergence test results. On objective tests, however, we uncovered a marked amount of horizontal pincushioning that could not be corrected. The TX-C7 showed no such problem: It placed in the middle of the pack on most measures.

EIZO FLEXSCAN TX-C7 The clever design of the EIZO Nanao line lets you add an optional snap-on speaker module or USB hub.

Setup and configuration is identical for both monitors. The on-screen menu is controlled by a single five-way button that also gives immediate access to brightness and contrast settings. The monitors have

SUMMARY OF FEATURES

17- and 19-Inch Monitors

17-inch monitors **19-inch monitors**

■ YES ■ NO □ OPTIONAL

Products listed in review order	AcerView 76c	ADI MicroScan 5G	AOC Spectrum 7Glr	ArtMedia TN1885T	ATM Sylvania Precision S730A	Compaq V70	Continental DiGiview 1708D	CTX VL710
List/street price	$549 / $500	$825 / $750	$799 / $600	$988 / $830	$650 / $630	$699 direct	$699 / $600	$569 / $520
CRT manufacturer and type	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Sony Trinitron aperture grille	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Mitsubishi aperture grille	Matsushita Invar shadow mask
Dot or stripe pitch	0.27 mm	0.26 mm	0.26 mm	0.25 mm	0.28 mm	0.28 mm	0.25 mm	0.28 mm
Actual viewable area (diagonal)	15.7 inches	16.0 inches	15.8 inches	16.0 inches	15.6 inches	15.7 inches	16.0 inches	15.7 inches
Dimensions (HWD, in inches)	17.3 x 16.6 x 18.9	15.8 x 16.4 x 18.5	17.2 x 16.1 x 17.7	16.8 x 15.9 x 17.7	15.8 x 16.2 x 17.7	17.3 x 16.6 x 17.3	17.1 x 16.1 x 17.2	17.3 x 16.5 x 16.4
TCO-95–compliant	□ ($40)	■	■	■	■	■	■	■
Monitor can act as USB hub/Number of ports	□ ($20) / 4	■ / N/A	□ ($20) / 4	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A
Maximum noninterlaced vertical refresh rate at:								
1,800 x 1,440; 1,600 x 1,200; 1,280 x 1,024	N/A, N/A, 60 Hz	N/A, 85 Hz, 85 Hz	N/A, N/A, 75 Hz	N/A, 60 Hz, 75 Hz	N/A, N/A, 60 Hz	N/A, N/A, 60 Hz	N/A, 65 Hz, 75 Hz	N/A, 72 Hz, 85 Hz
1,152 x 870; 1,024 x 768	75 Hz, 85 Hz	75 Hz, 85 Hz	N/A, 85 Hz	75 Hz, 85 Hz	75 Hz, 85 Hz	75 Hz, 85 Hz	75 Hz, 85 Hz	90 Hz, 110 Hz
800 x 600	106 Hz	85 Hz	85 Hz	85 Hz	85 Hz	85 Hz	85 Hz	150 Hz
Mac-compatible/Accepts 2 simultaneous inputs	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Multimedia speakers: watts per channel (price)	2 watts ($15), 5 watts ($30)	None	2 watts ($20)	None	5 watts (included)	None	None	None
Image Controls								
On-screen display	■	■	■	■	■	■	■	■
Pincushioning/Pincushioning balance/Convergence	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Trapezoid/Parallelogram/Tilt	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
RGB color adjustment/Color temperature/Moiré cancellation	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Configuration lockout to prevent changes	■	■	■	■	■	■	■	■
Software utilities included	None	None	None	None	None	None	None	None
Warranty and Support								
Warranty term (CRT, parts, labor)	1 year	3.5 years	3 years	3 years	3 years	CRT, 1 year; parts, 3 years; labor, 1 year	CRT, 2 years; parts, 3 years; labor, 2 years	CRT, 2 years; parts and labor, 3 years
Quick-exchange program under warranty	None	5 business days	None	2 business days	None*	2 business days	None	None
Toll-free technical support	■	■	■	■	■	■	■	■
Technical-support hours (eastern time)	8:00–5:00 M–F	10:30–8:00 M–F	11:30–8:30 M–F	Noon–8:00 M–F	8:00–8:00 M–F	24 hours, 7 days	11:00–8:30 M–F	10:00–8:00 M–F
Web address	www.acer.com/acc	www.adiusa.com	www.aocltd.com	www.artmedia.com	www.osramsylvania.com	www.compaq.com	www.digiview.com	www.ctxintl.com

N/A—Not applicable. The product does not have this feature. * Pricing information not available at press time.

both D-sub and BNC connectors, as well as a source switch on the front panel—a combination that makes them easy to use in a dual-platform setting. Both also have serial ports and cables that let you control the settings from your keyboard.

Our evaluation units came with stereo speaker modules ($73 street) that slide neatly under the front of the screen. EIZO offers other modules, including a four-port USB hub (price pending).

Each monitor does a fine job. If there is any drawback at all, it is that they are priced near the top of the field.—*AP*

Gateway EV700

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (64-Hz refresh). $455 direct.*

Gateway 2000's EV700 is not a performance standout, but its solid image quality on our subjective tests and a very attractive price make it a good upgrade option for home and SOHO buyers. But don't try to buy the monitor if you aren't "a member of the Gateway family," as the company puts it; only new-system purchasers or past customers with a valid customer number will be able to order the unit.

The EV700 performed reasonably well on our subjective tests. There were no worrisome convergence problems or ghosting, and color tracking and uniformity were fine. The focus seemed a bit off, however, and we noticed some bouncing on our screen-regulation tests. Middling scores on our objective tests resulted in one of the lowest MonMark scores, though no test result stood out as unacceptable.

The EV700 uses the same round, disk-like control knob for user settings as the MAG InnoVision line, a feature that we like. If you already own or are planning to buy a Gateway in the near future, the EV700 is worth the upgrade price despite some shortcomings.—*JB*

Hansol 700P

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (67-Hz refresh). $630 street.*

With its flexibility of resolution, Hansol MultiTech's 700P monitor might be a

Continues

CTX EX700	CyberVision ds86D	Daytek DT-1731D	Dell UltraScan 1000HS	Delta DB-770KA	EIZO Nanao FlexScan FX-C6	EIZO Nanao FlexScan TX-C7	Gateway EV700	Hansol 700P	HP UltraVGA 1280
$599 / $550	$769 / $700	$699 / $500	$749 direct	N/A / $550	$1,067 / $960	$1,119 / $1,010	$455 direct	$749 / $630	$725 / $650
Hitachi Invar shadow mask	Mitsubishi aperture grille	Hitachi Invar shadow mask	Sony Trinitron aperture grille	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Mitsubishi aperture grille	Toshiba Invar shadow mask	Toshiba Invar shadow mask	Invar shadow mask
0.28 mm	0.25 mm	0.28 mm	0.25 mm	0.28 mm	0.26 mm	0.25 mm	0.28 mm	0.26 mm	0.28 mm
15.7 inches	16.0 inches	16.3 inches	15.9 inches	16.0 inches	15.6 inches	15.8 inches	15.9 inches	15.7 inches	15.7 inches
17.2 x 16.5 x 17.5	16.4 x 16.1 x 17.5	16.6 x 17.6 x 17.1	17.1 x 16.1 x 18.0	15.2 x 16.8 x 17.0	16.3 x 16.1 x 17.3	16.3 x 16.1 x 17.3	16.7 x 16.7 x 18.1	18.0 x 16.2 x 17.5	16.7 x 16.7 x 17.5
■	■	■	■	□ ($50)	■	■	■	□ ($10)	■
■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A	□* / 4	□* / 4	■ / N/A	■ / N/A	■ / N/A
N/A, 68 Hz, 80 Hz	N/A, 66 Hz, 77 Hz	N/A, N/A, 60 Hz	N/A, 67 Hz, 79 Hz	N/A, N/A, 60 Hz	N/A, N/A, 80 Hz	N/A, 73 Hz, 85 Hz	N/A, N/A, 64 Hz	N/A, 67 Hz, 75 Hz	N/A, N/A, 60 Hz
85 Hz, 106 Hz	75 Hz, 101 Hz	70 Hz, 85 Hz	93 Hz, 105 Hz	N/A, 85 Hz	95 Hz, 106 Hz	100 Hz, 113 Hz	75 Hz, 85 Hz	75 Hz, 85 Hz	N/A, 85 Hz
130 Hz	128 Hz	98 Hz	135 Hz	85 Hz	129 Hz	138 Hz	107 Hz	120 Hz	85 Hz
■■	■■	■■	■■	■■	■■	■■	■■	■■	■■
None	None	None	None	3 watts ($20)	1 watt ($73)	1 watt ($73)	None	None	10 watts ($75)
■	■	■	■	■	■	■	■	■	■
■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
■	■	■	■	■	■	■	■	■	■
None	None	None	PCM Profile	None	Colorific, Screen Manager Pro	Colorific, Screen Manager Pro	None	None	None
CRT, 2 years; parts and labor, 3 years	CRT, 1 year; parts, 3 years; labor, 2 years	3 years	1 year	CRT, 2 years; parts and labor, 3 years	3 years	3 years	3 years	CRT, 2 years, parts and labor, 3 years	3 years
None	2 business days	None	1 business day	None	None	None	1 business day	1 business day	None
■	■	■	■	■	■	■	■	■	■
10:00–8:00 M–F	9:00 A.M.–10:00 P.M. M–F	10:00–6:00 M–F	24 hours, 7 days	11:00–8:00 M–F	11:00–8:00 M–F	11:00–8:00 M–F	24 hours, 7 days	11:30–8:30 M–F	9:00–8:00 M–F
www.ctxintl.com	*www.cyberdisplay.com*	*www.daytek.com*	*www.dell.com*	*www.deltaca.com*	*www.eizo.com*	*www.eizo.com*	*www.gw2k.com*	*www.hansol-us.com*	*www.hp.com*

good choice for graphics and power users who need occasional high-resolution support on a tight budget. We were a little disappointed, however, with the unit's overall image quality.

The company touts its new "double dynamic focus system with hyperbolic focus compensation circuit," which is supposed to bring enhanced image quality and focus to the edges of the display area. In subjective testing, however, most of the problems we encountered related to focus, resolution, and moiré interference in the upper corners and along the edges. On our objective tests, the 700P placed slightly below average in the pack.

The Hanson 700P's price and resolution options are enticing, but you can do better elsewhere.—*BB*

Hewlett-Packard UltraVGA 1280

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $650 street.*

Hewlett-Packard's UltraVGA 1280 is geared toward its Vectra line of corporate PCs, and it targets the general corporate market. A reliable performer endowed with solid engineering, the HP is an intelligent choice for business users.

The UltraVGA 1280 was competent on our subjective tests. Its geometry, focus, and color handling were quite good, though we noticed some blooming on a few test screens. The unit garnered a MonMark score in the average range and posted excellent results on the Miscconvergence, Pincushioning, Luminance, and Luminance Variance measures.

Our only complaint was with the display controls, which we found a bit confusing to master. Though snazzier monitors are available, the HP UltraVGA 1280 is a good choice for corporate users.—*JB*

Hyundai DeluxScan 17B+

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $470 street.*

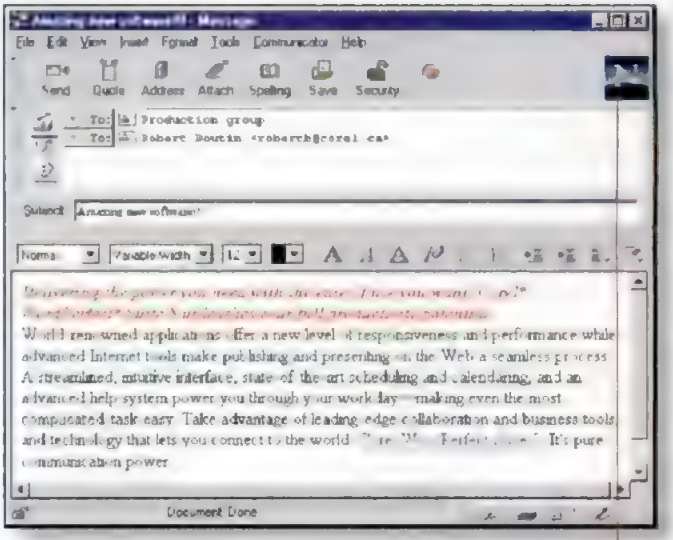
Hyundai Electronics America's DeluxScan 17B+ is a bargain-priced monitor targeted at budget-constrained corporate and SOHO users. Its overall performance trailed that of other units we tested, but the

Corel® WordPerfect® Suite 8

Fully Integrated Web

Communication Features	Corel CENTRAL™ 8†	Microsoft® Outlook 97
Create a "Planner" containing a calendar and multiple card files	✓	no
Publish to HTML	✓	no
Add freeform notes to calendar	✓	no
Easily add custom fields to address book	✓	no
Schedule group events over the Internet	✓	no
Assign To Do items over the Internet	✓	no
Easily follow e-mail threads	✓	no
Compose content-rich HTML messages for assigned To Do items	✓	no
Type personal To Do items directly in list	✓	no
Built-in conferencing	✓	no
Built-in HTML page composer	✓	no
Access Internet newsgroups and corporate discussion groups using mailbox interface	✓	no
Conduct and save a "live" chat session	✓	no
Organize cards into groups	✓	no
Participate in collaborative Internet browsing	✓	no
Support for LDAP	✓	no
Surf the Internet using an integrated browser	✓	no
Create simple, flexible card files	✓	no
Link cards to documents or applications	✓	no

Corel® WordPerfect® Suite 8 delivers the best features to stay on top—in business, at home, wherever you want to make an impact. All-new applications like **CorelCENTRAL™ 8** with fully integrated **Netscape® Communicator**—available in *both* the standard and professional versions—maximize your communication, organization and teamwork capabilities. Corel WordPerfect Suite 8—office suite technology that takes you further.



Mailbox – send and receive e-mail messages using open Internet standards

To buy Corel WordPerfect Suite 8, contact your local reseller.

BEST BUY

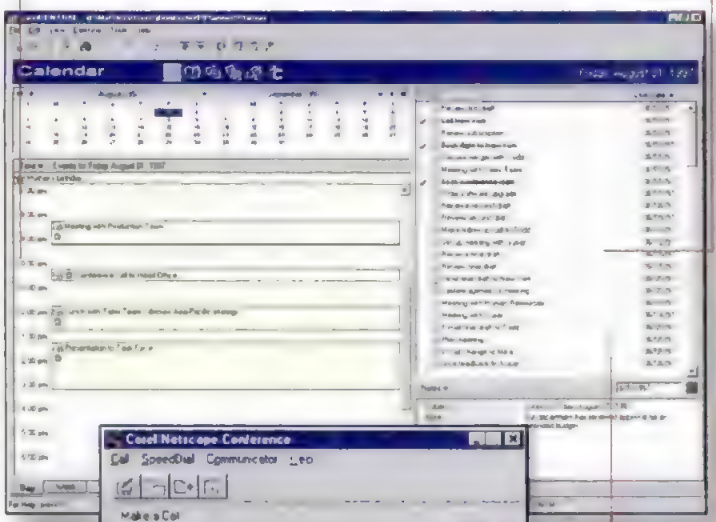
OfficeMax
Taking Your Savings To The Max!™
1-800-788-8080

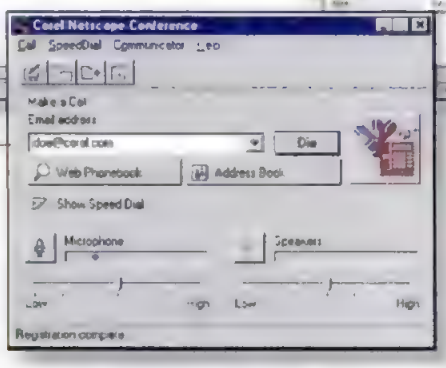
*For upgrade version only. US$ plus applicable taxes and shipping. Dealer may sell for less. Prices may vary from store to store.

+ Netscape® Communicator & Desktop Power

Calendaring and Scheduling – organize and keep track of your schedule and tasks, and create personal and workgroup tasks

Flexible Card Files – store a wide variety of information including contacts and inventory. Ultra-powerful linking technology lets you connect card file records, other files, even Internet addresses





Multiple View – view data from different perspectives using a simple, browser-like interface

Conferencing – share information and have real-time voice conversations using your Internet connection

Includes Netscape Communicator

Two great office suites. Outstanding communication technology.

Office Suite Excellence

†Internet connection required for many of the features included in CorelCENTRAL 8.

Copyright © 1997 Corel Corporation. All rights reserved. Corel, WordPerfect and CorelCENTRAL are trademarks or registered trademarks of Corel Corporation or Corel Corporation Limited. Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. Netscape and Netscape Communicator are trademarks of Netscape Communications Corporation. The MMX logo is a trademark of Intel Corporation. All other product, font and company names and logos are trademarks or registered trademarks of their respective companies.

CIRCLE 011 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Corel, Official World Title Sponsor of the COREL WTA TOUR

CORELCENTRAL

CORELCENTRAL

CORELCENTRAL

SUMMARY OF FEATURES

17- and 19-Inch Monitors

PC MAGAZINE EDITORS' CHOICE

17-inch monitors 19-inch monitors ■ YES ■ NO □ OPTIONAL Products listed in review order	Hyundai DeluxScan 17B+	IBM G72	iiyama VisionMaster Pro 17	KDS Visual Sensations VS-9	LG Electronics GoldStar StudioWorks 78D	MAG DJ787	MAG DJ717	Mitsubishi Diamond Pro 87TXM
List/street price	$649 / $470	N/A / $650	$849 / $700	$791 / $650	$799 / $780	$699 / $600	$799 / $700	$829 / $800
CRT manufacturer and type	Matsushita Invar shadow mask	Samsung Invar shadow mask	Mitsubishi aperture grille	Hitachi Invar shadow mask	Mitsubishi aperture grille	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Mitsubishi aperture grille
Dot or stripe pitch	0.28 mm	0.28 mm	0.25 mm	0.26 mm	0.25 mm	0.26 mm	0.26 mm	0.25 mm
Actual viewable area (diagonal)	15.7 inches	15.7 inches	16.0 inches	15.8 inches	15.9 inches	16.1 inches	16.1 inches	16.0 inches
Dimensions (HWD, in inches)	16.1 x 16.6 x 17.6	16.4 x 16.8 x 17.2	16.6 x 16.2 x 16.5	16.7 x 16.2 x 17.9	16.9 x 16.2 x 17.0	16.7 x 16.1 x 17.1	16.7 x 16.1 x 17.1	16.1 x 16.1 x 16.7
TCO-95–compliant	□ ($8)	■	■	■	■	■	■	■
Monitor can act as USB hub/Number of ports	□ ($20) / 4	■ / N/A	□ ($130) / 4	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A
Maximum noninterlaced vertical refresh rate at:								
1,800 x 1,440; 1,600 x 1,200; 1,280 x 1,024	N/A, N/A, 60 Hz	N/A, N/A, N/A	N/A, 72 Hz, 85 Hz	N/A, 78 Hz, 91 Hz	N/A, 66 Hz, 80 Hz	N/A, N/A, 65 Hz	N/A, 69 Hz, 80 Hz	N/A, 68 Hz, 80 Hz
1,152 x 870; 1,024 x 768	N/A, 85 Hz	N/A, 85 Hz	90 Hz, 112 Hz	107 Hz, 120 Hz	90 Hz, 100 Hz	75 Hz, 85 Hz	75 Hz, 105 Hz	94 Hz, 106 Hz
800 x 600	85 Hz	85 Hz	142 Hz	120 Hz	120 Hz	110 Hz	133 Hz	136 Hz
Mac-compatible/Accepts 2 simultaneous inputs	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Multimedia speakers: watts per channel (price)	None	None	None	None	None	None	None	None
Image Controls								
On-screen display	■	■	■	■	■	■	■	■
Pincushioning/Pincushioning balance/Convergence	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Trapezoid/Parallelogram/Tilt	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
RGB color adjustment/Color temperature/Moiré cancellation	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Configuration lockout to prevent changes	■	■	■	■	■	■	■	■
Software utilities included	None	None	Colorific	None	None	None	None	Diamond Control, Diamond Match
Warranty and Support								
Warranty term (CRT, parts, labor)	3 years	3 years	3 years	CRT, 2 years; parts, 3 years; labor, 1 year	3 years	3 years	3 years	3 years
Quick-exchange program under warranty	2 business days	2 business days	Optional	1 business day	None	1 business day	1 business day	2 business days
Toll-free technical support	■	■	■	■	■	■	■	■
Technical-support hours (eastern time)	11:00–8:00 M–F	24 hours, 7 days	8:00–8:00 M–F	11:00–10:00 M–F	24 hours, 7 days	10:00–8:00 M–F	10:00–8:00 M–F	8:00–8:00 M–F
Web address	*www.hea.com*	*www.pc.ibm.com*	*www.iiyama.com*	*www.kdsusa.com*	*www.lgeus.com*	*www.maginnovision.com*	*www.maginnovision.com*	*www.mitsubishi-display.com*

N/A—Not applicable: The product does not have this feature.

image quality is certainly good enough for typical office and home productivity tasks.

In subjective testing, the DeluxScan had mixed results. For example, photo images were true and sharp, though color intensity was a little low. Text was clear and legible, however, even in the corners. All its objective test results were acceptable, and on several measures its scores were excellent.

Hyundai backs the unit with a three-year warranty covering parts, labor, and even the CRT. It offers a four-port USB add-on hub ($20). Though not a performance standout, the attractive price makes it easier to overlook minor shortcomings.—*JB*

IBM G72

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum and recommended resolution (85-Hz refresh). $650 street.*

IBM Corp.'s G72 monitor is a fine choice for mainstream business applications. You can find better performance—and a greater range of resolutions—for the same money or less, but if you want a unit with the IBM logo on a sleek black case, the G72 won't disappoint.

In subjective testing, the IBM's geometry, focus, and color control were very good. Screen regulation was solid, and there was only minor misconvergence in the corners of the display. The screen-regulation tests that make many monitor images jump elicited a barely visible pulse, indicating good power control.

The G72's front-mounted user control panel has 12 buttons in all, but users can master all the adjustments in a short time. Oddly, these many buttons let you change relatively few screen attributes; there are

IBM G72 A sleek black look adds extra panache to this workmanlike IBM monitor.

Continues

	NEC MultiSync A700	NEC MultiSync E700	Nokia Multigraph 447Za	Optiquest V773	Panasonic PanaSync S70	Panasonic PanaFlat PF70	Philips 107B	PiXie PBC-7164	Princeton E072	Sampo AlphaScan 750
	N/A / $650	N/A / $700	N/A / $650	$599 / $550	$750 / $600	$999 / $850	N/A / $600	$599 / $500	$639 / $600	$699 / $630
	NEC Invar shadow mask	NEC CromaClear slot mask	Hitachi Invar shadow mask	Toshiba Invar shadow mask	Matsushita Invar shadow mask	Matsushita aperture grill	Matsushita Invar shadow mask	Hitachi Invar shadow mask	Toshiba Invar shadow mask	Hitachi Invar shadow mask
	0.28 mm	0.25 mm	0.27 mm	0.26 mm	0.27 mm	0.24 mm	0.24 mm	0.28 mm	0.26 mm	0.25 mm
	15.6 inches	15.6 inches	16.0 inches	15.8 inches	16.0 inches	16.0 inches	15.9 inches	15.7 inches	15.8 inches	15.8 inches
	16.8 x 15.9 x 17.3	16.8 x 15.9 x 17.8	17.9 x 16.6 x 16.8	16.4 x 16.1 x 17.5	16.4 x 16.1 x 17.5	16.4 x 16.1 x 17.0	17.6 x 16.4 x 16.8	17.4 x 16.5 x 16.9	16.9 x 16.0 x 17.9	16.0 x 16.1 x 17.1
	■	■	■	■	■	■	■	■	■	■
	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A
	N/A, N/A, 65 Hz	N/A, 65 Hz, 76 Hz	N/A, N/A, 65 Hz	N/A, N/A, 65 Hz	N/A, N/A, 66 Hz	N/A, 65 Hz, 81 Hz	N/A, N/A, 64 Hz	N/A, N/A, 65 Hz	N/A, N/A, 66 Hz	N/A, 70 Hz, 80 Hz
	75 Hz, 85 Hz	89 Hz, 100 Hz	78 Hz, 90 Hz	76 Hz, 86 Hz	N/A, 85 Hz	N/A, 106 Hz	75 Hz, 87 Hz	75 Hz, 85 Hz	N/A, 85 Hz	85 Hz, 110 Hz
	85 Hz	120 Hz	110 Hz	108 Hz	108 Hz	134 Hz	110 Hz	100 Hz	110 Hz	130 Hz
	■■	■■	■■	■■	■■	■■	■■	■■	■■	■■
	None	None	5 watts (included)	None	None	None	2 watts (included)	6 watts ($30), 15 watts ($40)	None	None
	■	■	■	■	■	■	■	■	■	■
	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
	■	■	■	■	■	■	■	■	■	■
	None	None	Colorific	INF	None	None	None	None	Coloright	None
	3 years	3 years	CRT, 2 years; parts and labor, 3 years	CRT, 3 years; parts, 3 years; labor, 1 year	3 years	3 years	3 years	3 years	3 years	3 years
	1 business day	1 business day	2 business days	Optional	1 business day	1 business day	None	3 business days	1 business day	None
	■	■	■	■	■	■	■	■	■	■
	8:00–8:30 M–F	8:00–8:30 M–F	8:00–8:00 M–F	10:00–9:00 M–F	24 hours, 7 days	24 hours, 7 days	8:00–8:00 M–F	11:30–8:30 M–F	10:00–8:00 M–F	8:30–5:00 M–F
	www.nec.com	*www.nec.com*	*www.nokia.com*	*www.optiquest.com*	*www.panasonic.com/elive*	*www.panasonic.com/elive*	*www.philipsmonitor.com*	*www.pixie.com*	*www.prgr.com*	*None*

no color adjustments, for example.

There's little fancy about the G72, except maybe its black color and full three-year warranty. A standard monitor suitable for general business or home use, the G72 comes with no surprises.—*BB*

iiyama VisionMaster Pro 17

PC MAGAZINE EDITORS' CHOICE

SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,280-by-1,024 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (72-Hz refresh). $700 street.*

The VisionMaster Pro 17, from iiyama North America, is a high-performance monitor that offers better-than-usual frequency support at top resolution modes. Targeted at high-end graphics and imaging professionals who need the VisionMaster's excellent screen geometry, accurate color control, and fast performance, this monitor gives up nothing to its big-name (read: Sony) competition.

IIYAMA VISIONMASTER The iiyama VisionMaster Pro 17 is a top performer.

The VisionMaster was a top performer in subjective testing. The photo image samples had particularly outstanding focus and color accuracy. On our objective tests, half of the VisionMaster's scores were excellent; none were unacceptable.

There are three buttons for users to step through screen-control adjustments, including advanced features such as moiré cancellation and convergence. iiyama also offers a four-port USB hub for the monitor ($130). Able to meet the demands of graphics professionals but priced in reach of a wider range of users, the iiyama VisionMaster Pro 17 is a great success.—*BB*

SUMMARY OF FEATURES

17- and 19-Inch Monitors

17-inch monitors **19-inch monitors**

■ YES ■ NO □ OPTIONAL

Products listed in review order

	Samsung SyncMaster 700b (PC MAGAZINE EDITORS' CHOICE)	Samsung SyncMaster 700p	Sceptre P75A	Shamrock C705T	Shinho AV2 765F	Smile CB6736SL	Sony Multiscan CPD-200SX (PC MAGAZINE EDITORS' CHOICE)	Sony Multiscan CPD-200SF
List/street price	$759 / $600	$1,009 / $830	$565 / $500	$699 / $550	N/A / $530	$639 / $575	N/A / $650	N/A / $750
CRT manufacturer and type	Samsung Invar shadow mask	Samsung Invar shadow mask	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Samsung Invar shadow mask	NEC CromaClear slot mask	Sony Trinitron aperture grille	Sony Trinitron aperture grille
Dot or stripe pitch	0.28 mm	0.26 mm	0.26 mm	0.26 mm	0.26 mm	0.25 mm	0.25 mm	0.25 mm
Actual viewable area (diagonal)	15.7 inches	15.7 inches	15.9 inches	15.7 inches	15.8 inches	16.0 inches	15.9 inches	15.9 inches
Dimensions (HWD, in inches)	16.7 x 16.7 x 17.6	16.7 x 16.7 x 17.6	15.8 x 15.4 x 16.4	16.1 x 16.1 x 16.8	16.5 x 16.1 x 17.4	16.9 x 16.5 x 16.5	16.7 x 16.2 x 18.2	16.8 x 16.0 x 17.8
TCO-95–compliant	■	■	□ ($20)	■	□ (no charge)	■	■	■
Monitor can act as USB hub/Number of ports	■ / N/A	■ / N/A	□ ($20) / 6	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A
Maximum noninterlaced vertical refresh rate at:								
1,800 x 1,440; 1,600 x 1,200; 1,280 x 1,024	N/A, N/A, 60 Hz	N/A, 68 Hz, 80 Hz	N/A, 70 Hz, 85 Hz	N/A, 70 Hz, 80 Hz	N/A, N/A, 70 Hz	N/A, N/A, 60 Hz	N/A, N/A, 65 Hz	N/A, 60 Hz, 75 Hz
1,152 x 870; 1,024 x 768	75 Hz, 85 Hz	70 Hz, 105 Hz	100 Hz, 110 Hz	85 Hz, 95 Hz	60 Hz, 85 Hz	N/A, 85 Hz	75 Hz, 85 Hz	75 Hz, 85 Hz
800 x 600	110 Hz	135 Hz	120 Hz	106 Hz	100 Hz	90 Hz	85 Hz	85 Hz
Mac-compatible/Accepts 2 simultaneous inputs	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Multimedia speakers: watts per channel (price)	None	None	None	None	None	None	None	None
Image Controls								
On-screen display	■	■	■	■	■	■	■	■
Pincushioning/Pincushioning balance/Convergence	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Trapezoid/Parallelogram/Tilt	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
RGB color adjustment/Color temperature/Moiré cancellation	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Configuration lockout to prevent changes	■	■	■	■	■	■	■	■
Software utilities included	None	Colorific	None	None	None	None	None	None
Warranty and Support								
Warranty term (CRT, parts, labor)	3 years	3 years	CRT, 3 years; parts, 3 years; labor, 1 year	CRT, 1 year; parts, 3 years; labor, 2 years	3 years	3 years	CRT, 2 years; parts and labor, 3 years	CRT, 2 years; parts and labor, 3 years
Quick-exchange program under warranty	2 business days	2 business days	None	None	None	None	2 business days	2 business days
Toll-free technical support	■	■	■	■	■	■	■	■
Technical-support hours (eastern time)	24 hours, 7 days	24 hours, 7 days	8:30–5:30 M–F	11:00–8:00 M–F	11:30–8:30 M–F	11:00–8:00 M–F	9:00 A.M.–10:00 P.M. M–F, 10:00–6:00 Sat.	9:00 A.M.–10:00 P.M. M–F, 10:00–6:00 Sat.
Web address	*www.sosimple.com*	*www.sosimple.com*	*www.sceptretech.com*	*www.shamrockusa.com*	*www.shinhousa.com*	*www.smilekfc.com*	*www.sony.com/technology*	*www.sony.com/technology*

N/A—Not applicable: The product does not have this feature

KDS Visual Sensations VS-9

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (91-Hz refresh), 1,600-by-1,200 maximum resolution (78-Hz refresh). $650 street.*

The Visual Sensations VS-9, from KDS USA, is another high-bandwidth, high-quality monitor in a well-priced package. Targeted at mainstream business users and the SOHO market, the VS-9 is worthy of consideration.

The VS-9 scored very well on our objective tests, ranking near the top of the pack with its composite MonMark score. It also scored well among monitors in its price range on our subjective tests. The unit's geometry, convergence, and uniformity were especially good, as were its text and color handling. Our display did exhibit some minor problems with the intensity of black areas on the screen (showing some gray), and a slight fading of bright reds.

With very simple controls and adequate on-screen display menus, any adjustments you want to make will be simple and straightforward.

MAG DJ717 **MAG's DJ series offers a combination disk-and-button that gives quick access to screen attributes. It's easy, and kinda fun.**

Continues

Sony Multiscan CPD-220VS	TeleVideo SVP260	Toshiba TekBright 700PM
N/A / $900	$779 / $720	N/A / $750
Sony Trinitron aperture grille	Mitsubishi aperture grille	Toshiba Invar shadow mask
0.25 mm	0.25 mm	0.26 mm
16.0 inches	16.0 inches	15.8 inches
19.0 x 18.9 x 16.8	16.7 x 16.1 x 17.1	22.1 x 17.8 x 18.2
	($30)	
/ 2	/ N/A	/ N/A
N/A, N/A, 60 Hz	N/A, 66 Hz, 77 Hz	N/A, 60 Hz, 75 Hz
N/A, 85 Hz	92 Hz, 101 Hz	85 Hz, 100 Hz
85 Hz	120 Hz	120 Hz
3.5 watts (included)	None	5 watts (included)
None	None	Toshiba Monitor Control
1 year	3 years	3 years
2 business days	2 business days	1 business day
24 hours, 7 days	10:30–9:00 M–F	24 hours, 7 days
www.sony.com/pc	www.televideoinc.com	www.computers.toshiba.com

The Visual Sensations VS-9 is a very good performer and a relative bargain.—*SB*

LG GoldStar StudioWorks 78D

SPECIFICATIONS: *17-inch Mitsubishi aperture-grille tube (0.25-mm stripe pitch), 1,152-by-870 maximum recommended resolution (90-Hz refresh), 1,600-by-1,200 maximum resolution (66-Hz refresh). $780 street.*

The GoldStar StudioWorks 78D, from LG Electronics U.S.A., is a high-bandwidth monitor suitable for power users and the corporate desktop. While its aperture-grille tube and resolution flexibility might interest graphics professionals, other monitors in its price range performed better.

In subjective testing, the GoldStar had bright and vibrant colors, but color uniformity, focus, geometry, and convergence were uninspiring. It placed a little above average overall with its MonMark score, though we did record an unacceptable amount of horizontal pincushioning that could not be corrected with the user controls.

Those controls are fairly complete, though we found the adjustment rotator hard to manipulate; we often overshot our intended selection. The GoldStar StudioWorks 78D is a competent monitor, but you can do better for the price.—*JB*

MAG DJ707, DJ717

DJ707 SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (65-Hz refresh). $600 street.*
DJ717 SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,024-by-768 maximum recommended resolution (105-Hz refresh), 1,600-by-1,200 maximum resolution (69-Hz refresh). $700 street.*

MAG InnoVision's new 17-inch monitors are suitable for both corporate desktops and imaging applications. The DJ707 is an affordable mainstream model; its close sibling, the DJ717, delivers high-resolution capabilities and more user controls. Both monitors are middle-of-the-pack performers and reasonable candidates in their respective markets.

In subjective testing, the DJ707 had mixed results. The unit's focus and resolution were good, and it produced a clear photo image with good colors. On the downside, the screen-regulation control was very poor, with lots of pulsing. There was also significant black-level shifting, noticeable streaking, and some halo effect—all of which suggest the monitor isn't very well suited for multimedia applications.

The DJ717 showed tighter geometry control than the DJ707 and better gray-scale control. We again noticed pulsing on the screen-regulation test, however, along with noticeable red/blue misconvergence, black-level shifting, and halos.

These two monitors can claim to have the most fun and intuitive control panels we've seen: You'll find a button/dial combination disk on each (called a JAG control) that you use to search, select, and set geometry and color adjustments. The higher-end DJ717 adds color temperature, color mode, and color recall to the list of settings available.

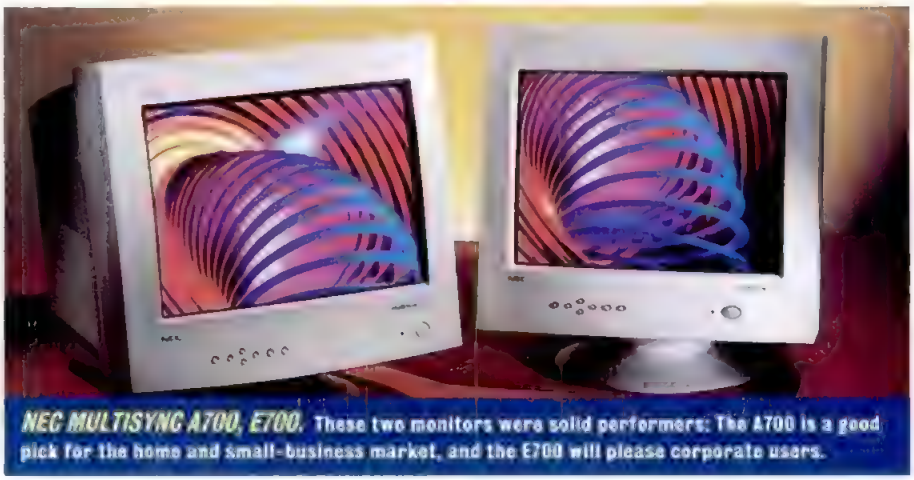
Either MAG monitor is acceptable for general applications, with an emphasis on simple user-control adjustment. While neither is a front-running performer in this test group, the two units are both reasonable values.—*BB*

Mitsubishi Diamond Pro 87TXM

SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm dot pitch), 1,152-by-870 maximum recommended resolution (94-Hz refresh), 1,600-by-1,200 maximum resolution (68-Hz refresh). $800 street.*

Targeted at image-editing professionals and corporate power users, Mitsubishi Electronics America's Diamond Pro 87TXM is a solid value for a high-performance monitor packed with features. With above-average scores on both our subjective and objective tests, the unit proved itself worthy of professional applications as well as general business use.

The Diamond Pro scored very well on our Luminance Variance and Color Variance tests, delivering an even picture. It was equally adept at handling text or photo images.



NEC MULTISYNC A700, E700. These two monitors were solid performers: The A700 is a good pick for the home and small-business market, and the E700 will please corporate users.

Envision an enterprise that's
completely compatible,
infinitely scalable, totally expandable,
easily manageable, and entirely mobile.
intel inside
PENTIUM PRO
*Actual results may vary depending on usage. ©1997 Acer America Corporation. Acer and the Acer logo are registered trademarks, and AcerAlert is a trademark of Acer America Corporation and Acer Inc. Intel, the Intel Inside Logo, and Pentium are registered trademarks of Intel Corporation.

Introducing Acer's

mobile client server

solution — the new way to truly realize enterprise productivity.

Today, many companies are extending the enterprise into virtual offices. Add to that an increasingly mobile workforce, and a compatible, integrated solution becomes vital to ensure anytime, anywhere access to information.

By design, Acer's full range of Mobile Client Server solutions, like the AcerAltos™ 9000Pro server with dual Intel® Pentium® Pro processors, provide compatibility, connectivity, security, mobility, accessibility, and manageability. And help you gain a competitive edge.

As one of the world's largest personal computer and component manufacturers, Acer has the core technological capabilities critical to your enterprise. Plus, the channel relationships and resources to provide you single-call support.

Acer's Mobile Client Server. Now you can have the compatibility you need to be endlessly productive.

Acer

1-800-558-ACER & select option 2, 1
www.acer.com/aac/

With an industry leading 7-hour single battery notebook, Acer is redefining mobile solutions.

With a new Network Ready PC, Acer has a range of products that make sense.

AcerAltos servers have manageability built-in.

CIRCLE 092 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

SUMMARY OF FEATURES

17- and 19-Inch Monitors

17-inch monitors **19-inch monitors**

■ YES ■ NO □ OPTIONAL

Products listed in review order	Utobia XP400	ViewSonic G771	ViewSonic PT775	Cornerstone Color 45/101sf	Gateway EV900	NSA/Hitachi SuperScan Elite 751	Philips Brilliance 109
List/street price	N/A / $630	$659 / $620	$899 / $850	N/A / $1,300	$755 direct	$1,149 / $1,100	N/A / $1,200
CRT manufacturer and type	Mitsubishi aperture grille	Matsushita Invar shadow mask	Mitsubishi aperture grille	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Hitachi Invar shadow mask
Dot or stripe pitch	0.25 mm	0.27 mm	0.25 mm	0.26 mm	0.26 mm	0.26 mm	0.26 mm
Actual viewable area (diagonal)	16.2 inches	16.0 inches	16.0 inches	18.1 inches	18.0 inches	18.0 inches	17.9 inches
Dimensions (HWD, in inches)	16.1 x 16.7 x 17.1	16.4 x 16.1 x 17.5	16.8 x 16.3 x 18.0	17.8 x 17.6 x 18.1	17.1 x 18.1 x 18.3	17.9 x 17.6 x 18.1	19.3 x 19.1 x 20.3
TCO-95–compliant	■	■	■	■	■	□ ($50)	■
Monitor can act as USB hub/Number of ports	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A	■ / N/A	□ ($50) / 4
Maximum noninterlaced vertical refresh rate at:							
1,800 x 1,440; 1,600 x 1,200; 1,280 x 1,024	N/A, 60 Hz, 75 Hz	N/A, N/A, 66 Hz	N/A, 77 Hz, 89 Hz	N/A, 81 Hz, 89 Hz	N/A, 68 Hz, 80 Hz	N/A, 75 Hz, 85 Hz	N/A, 75 Hz, 88 Hz
1,152 x 870; 1,024 x 768	75 Hz, 85 Hz	77 Hz, 87 Hz	104 Hz, 119 Hz	110 Hz, 117 Hz	93 Hz, 105 Hz	100 Hz, 115 Hz	103 Hz, 118 Hz
800 x 600	85 Hz	110 Hz	154 Hz	147 Hz	130 Hz	145 Hz	150 Hz
Mac-compatible/Accepts 2 simultaneous inputs	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Multimedia speakers: watts per channel (price)	None	None	None	None	None	None	2 watts (included)
Image Controls							
On-screen display	■	■	■	■	■	■	■
Pincushioning/Pincushioning balance/Convergence	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Trapezoid/Parallelogram/Tilt	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
RGB color adjustment/Color temperature/Moiré cancellation	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Configuration lockout to prevent changes	■	■	■	■	■	■	■
Software utilities included	None	None	Colorific	None	None	None	Colorific
Warranty and Support							
Warranty term (CRT, parts, labor)	CRT, 2 years; parts, 3 years; labor, 1 year	3 years	3 years	3 years	3 years	3 years	3 years
Quick-exchange program under warranty	None	Optional	Optional	Optional	1 business day	2 business days	None
Toll-free technical support	■	■	■	■	■	■	■
Technical-support hours (eastern time)	11:00–9:00 M–F	11:00–10:00 M–F	11:00–10:00 M–F	9:00–8:30 M–F	24 hours, 7 days	9:00–5:00 M–F	8:00–8:00 M–F
Web address	*www.utobia.com*	*www.viewsonic .com*	*www.viewsonic .com*	*www.corimage .com*	*www.gw2k.com*	*www .nsa-hitachi.com*	*www .philipsmonitors .com*

N/A—Not applicable. The product does not have this feature.

User control is aided by an extremely complete set of adjustments, including convergence and moiré cancellation. In addition to the usual front-panel buttons, Mitsubishi offers a mouse-driven software applet for controlling the monitor via your PC's serial port.

While it's not a monitor for those on a tight budget, the Diamond Pro 87TXM should be considered by anyone who wants good value for high-performance professional applications.—*BB*

NEC MultiSync A700, E700

A700 SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (65-Hz refresh). $650 street.*
E700 SPECIFICATIONS: *17-inch slot-mask tube (0.25-mm mask pitch), 1,152-by-870 maximum recommended resolution (89-Hz refresh), 1,600-by-1,200 maximum resolution (65-Hz refresh). $700 street.*

The two MultiSync entries from NEC Technologies have slightly different faceplates, but the real difference is inside: The MultiSync A700 uses a traditional Invar shadow-mask tube, while the MultiSync E700 uses the latest version of NEC's own CromaClear slot-mask tube. The A700 is a good choice for typical productivity applications and is priced within the reach of home and small-business users. The E700 is aimed at NEC's traditional stronghold: corporate desktops. Both models are good performers and represent reasonable values.

Both MultiSyncs performed well on our tests, placing in the middle of the field overall on both objective and subjective measures. The A700 was particularly strong on the moiré tests and image

OPTIQUEST V773 This reliable performer is a great bargain for general business users.

	PiXie 995	Princeton EO90	Sampo AlphaScan 810
			Ends
	$999 / $900	$999 / $850-	$1,049 / $1,000
	Hitachi Invar shadow mask	Hitachi Invar shadow mask	Hitachi Invar shadow mask
	0.26 mm	0.26 mm	0.26 mm
	18.0 inches	18.0 inches	18.0 inches
	19.0 x 19.5 x 18.5	18.8 x 18.8 x 18.9	16.0 x 16.1 x 17.9
	■	■	■
	□ ($50) / 4	■ / N/A	■ / N/A
	N/A, 75 Hz, 85, Hz	N/A, 75 Hz, 86 Hz	N/A, 75 Hz, 88 Hz
	90 Hz, 95 Hz,	75 Hz, 116 Hz	85 Hz, 115 Hz,
	105 Hz	146 Hz	145 Hz
	■	■	■
	5 watts ($50)	None	None
	■	■	■
	■	■	■
	■	■	■
	■	■	■
	None	Coloright	None
	3 years	3 years	3 years
	3 business days	1 business day	None
	■	■	■
	11:30–8:30 M–F	10:00–8:00 M–F	8:30–5:00 M–F
	www.pixie.com	www.prgr.com	None

uniformity, and it had one of the brightest screens we saw. Photographic images were not as vivid as on some other monitors, however. The E700 had nearly perfect geometry and convergence and excellent photographic images, but it was subject to noticeable bounce in the screen-regulation test. Also, the focus did not seem quite as sharp.

The on-screen menu system is easy to use, and the six-button front panel gives you access to the basic image settings in an intuitive manner. NEC backs the monitors with a full three-year warranty and a 24-hour quick-exchange program. That, plus their reasonable prices and solid image quality, should put the MultiSync A700 and E700 monitors on your short list.—*AP*

Nokia Multigraph 447Za

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.27-mm dot pitch), 1,024-by-768 maximum recommended resolution (90-Hz refresh), 1,280-by-1,024 maximum resolution (65-Hz refresh). $650 street.*

Nokia Display Products' Multigraph 447Za performs very well and is a solid choice for the corporate or SOHO desktop. Packed with new technology and cost-saving features, the Multigraph 447Za incorporates a new mini-neck tube that uses less energy than most other 17-inch monitors. The unit also comes with a pair of 5-watt speakers, a microphone, and built-in audio and video jacks.

In subjective testing the Multigraph 447Za was one of the top performers in this roundup, with no discernible problems aside from a hint of blue/red misconvergence and minor ghosting. The unit's generally strong objective test measures were marred only by a poor Vertical Pincushioning result.

The Multigraph 447Za has an initially confusing array of user control buttons on the front panel, with no on-screen display (one of only two units in this review without an OSD). It takes a little practice to find your way around, but the unit does provide a wide range of controls over screen geometry, colors, and moiré cancellation.

It's hard to believe the Multigraph 447Za is considered a "value" monitor—it performs so well and has so many attractive features. General business users and those using moderately demanding applications should be happy with this display.—*BB*

Optiquest V773

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,024-by-768 maximum recommended resolution (86-Hz refresh), 1,280-by-1,024 maximum resolution (65-Hz refresh). $550 street.*

The Optiquest V773, from ViewSonic's value brand Optiquest, is a great deal for SOHO applications and for regular business users. The V773 performed well on subjective measures, placing near the top overall. Screen geometry control, focus, color, and photo image display were all fine, with no significant problems noticeable except for some pulsing during regulation testing. Objective tests revealed an unacceptable amount of horizontal pincushioning, however, which pulled down the unit's overall MonMark score.

PANAFLAT PF70 The revolutionary PanaFlat sports a new tube design that is truly flat in both the horizontal and vertical planes.

You use four buttons to adjust basic screen settings, including geometry and color controls. For general business applications, you'll be more than satisfied with the performance of the Optiquest V773, and happy, too, with the money you've saved.—*BB*

Panasonic PanaSync S70, PanaFlat PF70

S70 SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.27-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (66-Hz refresh). $600 street.*
PF70 SPECIFICATIONS: *17-inch aperture-grille tube (0.24-mm stripe pitch), 1,024-by-768 maximum recommended resolution (106-Hz refresh), 1,600-by-1,200 maximum resolution (65-Hz refresh). $850 street.*

These two monitors from Panasonic Computer Peripheral Co. have different missions but are likely to have broad appeal. The PanaSync S70 is a competitively priced unit aimed at the general consumer market, while the innovative PanaFlat PF70 uses the company's new

PHILIPS 107B An acceptable performer with an appealing price, this unit also delivers business-quality sound.

Pure Flat picture tube and is meant for corporate installations.

Setup and features are similar for the two monitors. They share the same front-panel button arrangement and easy-to-use on-screen configuration menus with text prompts. The PF70 has dual inputs but could be improved by adding a front-panel source switch to toggle between inputs; at present, you have to reach behind the monitor to change sources.

Notably, the PanaFlat tube in the PF70 is the only tube on the market that is truly flat in both the vertical and horizontal planes, with no curve at all—much like an LCD panel. The flat glass reduces reflected glare and creates the illusion of incredible depth.

Both monitors placed in the middle of the pack on objective tests. The PF70 was generally above average, exhibiting only small flaws on the Misconvergence test and some image geometry problems. The big surprise was the less expensive PanaSync S70: With its near-perfect convergence, outstanding image geometry and uniformity, and excellent photo image quality, this was one of the very best monitors we tested for this roundup.

If you would like a monitor with the fresh, flat look that you can get only with a liquid crystal display panel costing three times as much, the PanaFlat PF70 is an exciting and attractive option. If you are looking for one of the best bargains in the bunch, however, the PanaSync S70 is the clear winner.—*AP*

Philips 107B

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.24-mm dot pitch), 1,024-by-768 maximum recommended resolution (87-Hz refresh), 1,280-by-1,024 maximum resolution (64-Hz refresh). $600 street.*

The Philips 107B, from Philips Consumer Electronics, is a low-priced monitor that combines acceptable performance with a built-in microphone and speakers. It's more than suitable for business and home users watching their budgets.

In subjective testing the 107B showed excellent on-screen geometry and screen regulation; color handling, especially for skin tones, was quite good. We did notice some minor focus problems, evident in small details of our test patterns, where edges were not as crisp as they could have been. Misconvergence in the corners could be a problem for full-screen DTP work.

The sound that came from the side-firing speakers was not overwhelming but was good enough for business audio. The 107B should be considered by cost-conscious buyers looking for a monitor that will neither break the bank nor surpass modest expectations.—*SB*

PiXie PBC-7164

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), maximum resolution 1,280-by-1,024 (65-Hz refresh). $500 street.*

The PiXie PBC-7164, from PiXie Technologies, is one of the least expensive 17-inch monitors on the market. Though we might have been enticed by its affordability, we found its image quality was lacking. It's tough to recommend the PiXie to anyone other than the most casual of users.

The PiXie made a disappointing showing on our performance tests. Our subjective evaluation revealed serious problems with screen regulation and black-level shift; several test images showed an odd green tinge, and another was dominated by red. Although there were some good scores on our objective test suite—notably on the Luminance Variance and pincushioning tests—the PiXie posted the lowest score of the roundup on our MonMark composite measure.

In its favor, the PiXie comes with a generous three-year warranty, a built-in microphone (surprising at this price) and automatic optimization for a variety of system platforms. But while the frills are impressive, the display itself is not up to the level of its competition. For price/performance value, you may want to explore other options.—*JB*

Princeton EO72

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (66-Hz refresh). $600 street.*

Princeton Graphic Systems' Princeton EO72 is a solid value for corporate desktops and home and SOHO users. A more-than-acceptable image quality, a below-average price, and a full three-year warranty make the EO72 worth considering.

In subjective testing, the EO72 performed respectably. It showed tight geometry and excellent convergence. Color tracking and uniformity were very good, and text and photo images were clear and bright. In objective testing, the EO72 placed in the middle of the pack overall, with notably good Average MTF, Misconvergence, Luminance, and Luminance Variance scores. We did record an unacceptable amount of horizontal pincushioning on our test unit, however. Still, the Princeton EO72 is a fine fit for the budget-minded business user.—*JB*

Sampo AlphaScan 750

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.25-mm dot pitch), 1,152-by-870 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (70-Hz refresh). $630 street.*

If you need a high-bandwidth monitor for occasional high-resolution work but are on a budget, consider the AlphaScan 750, from Sampo Technology. Though not perfect, it's a solid monitor aimed at the choosy but price-conscious user.

In subjective testing, the AlphaScan 750 delivered very crisp text, excellent gray-scale images, and fairly good screen geometry. Those attributes, combined with the ability to handle resolutions up to 1,600-by-1,200, make the unit a good candidate for document processing and low-

SOUND BLASTER
SPEAKERS
PC-DVD
GRAPHICS CARDS
MULTIMEDIA KITS

Upgrade your PC to Cinema-Quality Video & Crystal-Clear Sound. Introducing PC-DVD™ Encore.™

Tomorrow's Technology at a Knock-Out Price Today!

Energize your senses with the unparalleled multimedia experience of PC-DVD Encore featuring Creative's exclusive DynamicXtended Resolution™ (Dxr2™) technology. Now, watch the hottest films and experience the enhanced definition, multi-channel Dolby Digital audio and full-motion MPEG-2 video that PC-DVD Encore delivers. Get superior output on your PC, or connect to your TV. Creative's proprietary software interface provides a complete range of viewing features, while the drive is fully backwards compatible, reading all CD formats. For more information, check out our Website at **www.soundblaster.com.**

Creative's PC-DVD Encore—The Complete Solution:

Revolutionary Dxr2 Decoder Card with DynamicXtended Resolution

- Connects to your TV with composite or S-video outputs
- Interfaces with your Dolby® Digital receiver for multi-channel, theater-like audio
- Sharpens MPEG-2 images to deliver enhanced definition, full motion video

High Performance Creative PC-DVD Drive

- Second generation, high-speed PC-DVD drive accesses DVD data twice as fast
- Reads all standard CD-ROM data at 20x, including CD-R and Photo CD®
- Reads large capacity DVD-ROM's—up to 17GB and 25 times more data than a standard CD

Cutting-Edge DVD Titles and Proprietary Software Interface

- Includes DVD megahits, exclusively for PC-DVD Encore
- Software interface allows fast forward/reverse, slow motion, stop action and crystal-clear single frame viewing

THE GREAT 64 GOLD GIVEAWAY
WIN GOLD!
TO ENTER, VISIT US AT:
HTTP://GOLD.SOUNDBLASTER.COM

The Hottest Upgrades Create The Coolest PC.

CREATIVE
WWW.SOUNDBLASTER.COM

* Estimated Street Price

CIRCLE 026 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Creative Labs Inc. and the Creative logo are registered trademarks and PC-DVD, Dxr2 and DynamicXtended Resolution are trademarks of Creative Technology Ltd. Dolby and the double-D symbol are registered trademarks of Dolby Laboratories. All other brand and product names are trademarks or registered trademarks of their respective holders. ©1997 Creative Technology Inc. All rights reserved. Printed in the USA.

end DTP needs. The color handling of the AlphaScan 750 was weaker, however, with some video bandwidth problems—especially in the blue tones—and washed-out colors in the red hues.

The AlphaScan 750 was very simple to set up and sported an improved control layout with some of the most straightforward controls in this roundup. A full three-year warranty completes this attractive package.—*SB*

Samsung SyncMaster 700b, 700p

PC MAGAZINE EDITORS' CHOICE

700B SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.28-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $600 street.*
700P SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,024-by-768 maximum recommended resolution (105-Hz refresh), 1,600-by-1,200 maximum resolution (68-Hz refresh). $830 street.*

Samsung Electronics America's two new monitors both perform admirably and are top choices for their target markets. The value-priced SyncMaster 700b would be equally welcome on corporate or SOHO desktops. The high-bandwidth SyncMaster 700p has the image quality and resolution flexibility for CAD/CAM, graphics, and desktop publishing applications, and is also a great value.

SAMSUNG SYNCMASTER 700B, 700P Those two offerings bring excellent performance and image quality to the SOHO and CAD/CAM markets.

The SyncMaster 700b was a top performer on subjective tests and was an admirable midrange performer in objective testing. In subjective testing, the 700b showed tight screen geometry control, including very tight regulation with great focus and color. We noted minimal red/blue misconvergence along with a little fuzziness in displaying a photo image, but neither problem is likely to be very noticeable in general use.

The professional-caliber SyncMaster 700p was the top-scoring monitor in this roundup on our MonMark composite measure, and its score on nearly every objective test fell within the "excellent" range. Its image quality held up well under subjective scrutiny, with impeccable handling of color, text, and geometry. In addition to the full range of user controls found on the 700b, the 700p adds a standard Mac adapter and Colorific software for color control.

Both of the Samsung SyncMaster 17-inch monitors are great choices. The 700b is ideal if you don't need superhigh resolutions and refresh rates and if you want to save money. For more demanding applications, you should go with the 700p, a top-performing display suitable for the pickiest of users.—*BB*

Sceptre P75A

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (85-Hz refresh rate), 1,600-by-1,200 maximum resolution (70-Hz refresh). $500 street.*

Sceptre Technologies' Sceptre P75A is an affordable monitor suitable for mainstream business users and DTP professionals alike. The higher bandwidth allows for more resolution choices than other monitors in its class have, and its solid performance results mean the unit will not disappoint.

The Sceptre turned in average results on both our objective and subjective measures. Text handling and overall focus were fine, as were convergence and uniformity. Our test unit tended to overdrive the green, which resulted in skin tones in photo images that were not completely natural.

The monitor's configuration controls were easy to use, and since Sceptre has provided separate brightness and contrast controls, you don't need to toggle to the on-screen display. All in all, the Sceptre P75A is worth considering, especially if you're on a budget.—*JB*

Shamrock C705T

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,152-by-870 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (70-Hz refresh). $550 street.*

The Shamrock C705T delivers adequate performance for its modest price. Shamrock Peripherals targets advanced users for desktop publishing, graphics, and CAD/CAM applications. While the monitor has the resolution flexibility to address those markets, our testing shows the Shamrock may be better suited for cost-conscious general users.

In our subjective testing, the monitor produced excellent photographic images with bright, clear colors. We noticed misconvergence problems, however, and there was a noticeable dark stripe along the left side of the screen. There was also a pronounced hook along the right edge at the top corner, and even the advanced corner pincushioning adjustment couldn't straighten it out. We also had to adjust the brightness to a relatively low setting in order to prevent black areas from showing as a faint gray.

Although the Shamrock C705T has the ability to display excellent color images, its poor screen geometry and other flaws make it better suited for budget-conscious users who can overlook these shortcomings.—*AP*

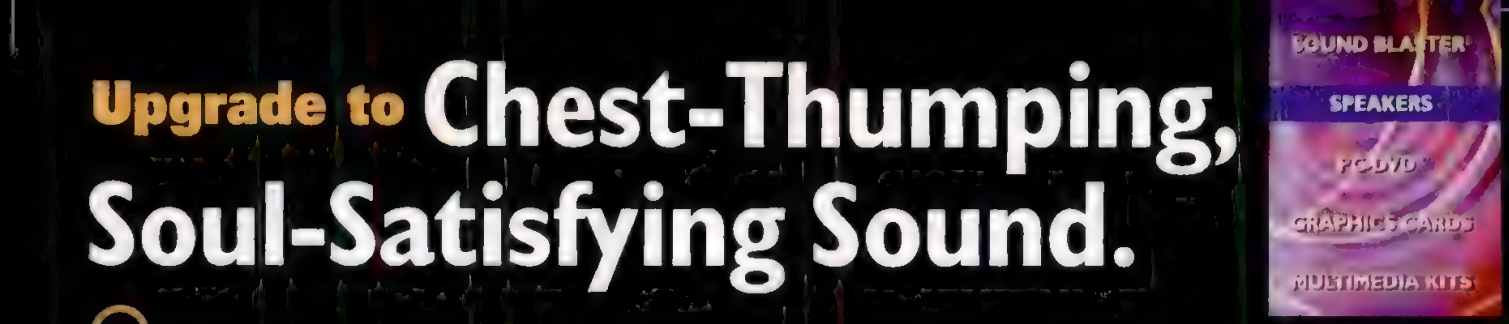
Shinho AV2 765F

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (70-Hz refresh). $530 street.*

Shinho Electronics and Communications' Shinho AV2 765F is an affordable monitor aimed at the cost-conscious business and general consumer. An average performer, it represents a reasonable value for its class.

The AV2 765F gave us no surprises during subjective evaluation, performing on a par with other units we saw in its price range. Geometry and convergence were fine, and focus and text handling were very good. We did notice a little streaking and ghosting, and photo images were less vivid than on some other monitors, but not enough to dissuade us.

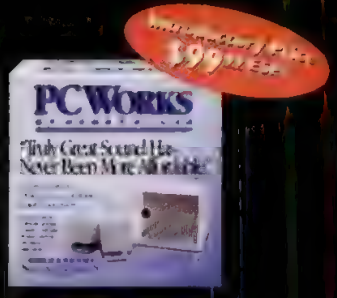
Upgrade to Chest-Thumping, Soul-Satisfying Sound.



MicroWorks™ by Henry Kloss

"The Cambridge SoundWorks Lineup Performs Far Beyond It's Price And Size Class."
— Stereo Review

Turn Your PC's Speakers Whine into a Roar!
Don't suffer through the tinny sound of your PC's speakers! Cambridge SoundWorks®, designers of highly acclaimed home theater speakers, introduces the ultimate in high performance, value priced speaker systems for your PC. These amplified subwoofer/satellite speakers allow you to hear everything—from the lyric melody of a violin to the high-powered roar of a jet at mach 5. Creative Labs and Cambridge SoundWorks—bringing home stereo audio to your PC at prices that can't be beat! For more information, check out our Website at **www.soundblaster.com.** or call 1.800.998.5227.



PC Works™
Enjoy the best home stereo audio value for your PC

"Overall Sound Quality is Very Clean, With Well-Defined Highs, Clear Mids, and Solid Bass."
-Computer Gaming World

SoundWorks®
Experience low bass, accurate stereoimaging and superior tonal balance on your PC

"May Just Outclass Your Home Hi-Fi."
- PC Gamer

MicroWorks™
Feel the ultimate in window-rattling, earth-shaking bass on your PC

"I Assumed That They Were Powered By Testosterone Rather Than Electricity."
-PC World

The Hottest Upgrades Create The Coolest PC.

CREATIVE

WWW.SOUNDBLASTER.COM

Estimated Street Prices

CIRCLE 040 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

The Creative logo and Sound Blaster are registered trademarks and PC-DVD and The Great 64 Gold Giveaway are trademarks of Creative Technology Ltd. in the United States and/or other countries. Cambridge SoundWorks and SoundWorks are registered trademarks and PCWorks and MicroWorks by Henry Kloss are trademarks of Cambridge SoundWorks, Inc. in the United States and/or other countries. ©1997 Creative Technology Inc. All rights reserved. Printed in the USA.

The AV2 765F was solid in objective testing, with particularly strong scores on the Average MTF and Luminance Variance tests.

User controls are entirely adequate for a general-purpose monitor, and Shinho backs the unit with a three-year warranty on parts, labor, and the CRT. If you need a low-priced monitor for general productivity tasks, consider the Shinho AV2 765F.—*JB*

Smile CB6736SL

SPECIFICATIONS: *17-inch slot-mask tube (0.25-mm mask pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $575 street.*

Smile International's Smile CB6736SL is a low-cost monitor based on NEC's CromaClear slot-mask tube. The monitor might be a good choice for budget-constrained home and business users sold on the benefits of CromaClear, but our testing showed Smile's implementation to be somewhat lacking.

For starters, the Smile's default refresh-rate setting at 1,024-by-768 is only 76 Hz (the current VESA spec calls for 85 Hz); you have to change the refresh rate to an acceptable 85 Hz through your graphics card's utility or other software control. Moreover, the unit had one of the lowest tallies on our series of subjective tests. There were noticeable screen halos, for example, and colors looked washed out. So despite its reasonable price, we'll pass on this unit.—*JB*

Sony Multiscan CPD-200SX, CPD-200SF, CPD-220VS

PC MAGAZINE EDITORS' CHOICE

CPD-200SX SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (65-Hz refresh). $650 street.*
CPD-200SF SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (60-Hz refresh). $750 street.*
CPD-220VS SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,280-by-1,024 maximum resolution (60-Hz refresh). $900 street.*

Sony Electronics' three new 17-inch monitors are right on target for their respective markets. The Multiscan CPD-200SX is a well-priced general-purpose display for corporate buyers and general consumers. The Multiscan CPD-200SF provides a step up in features, resolution capabilities, and image quality for more demanding graphics and power users. The Multiscan CPD-220VS, designed to complement the company's Vaio line of PCs, is a serious multimedia monitor for multimedia developers or gamers who need the ultimate in image output. All three Sony units placed at or near the top among the units we tested in subjective evaluation.

SONY CPD-220VS The Sony CPD-220VS, wearing the gray and lavender of the company's Vaio line, comes standard with a USB port connector.

The CPD-200SX performed extremely well on our subjective tests. Our test photo images looked absolutely superb, with bright, saturated colors. Geometry, focus, convergence, and color tracking could not have been better. The unit turned in generally average marks on our objective tests, resulting in an average overall MonMark score. It did show particular strengths on the Luminance, Luminance Variance, and Misconvergence tests. Three buttons are all that are used to control user settings on the CPD-200SX; these include basic screen geometry adjustment but no color controls.

Built for more demanding users, the CPD-200SF offers more resolution flexibility for Web-page designers and other professionals. Here again, on-screen image quality was superb, based on subjective evaluation. The unit also placed in the middle of the pack on our MonMark composite measure, with excellent results on the Luminance, Luminance Variance, and pincushioning tests. The CPD-200SF uses eight buttons to control settings and adds color-temperature adjustment to its array of options.

Though its price might seem high at first glance, the CPD-220VS combines Sony's video and audio technology into a top-flight multimedia monitor. The monitor is designed to match the Vaio PC and uses the same gray-and-lavender color scheme. Like its siblings, the CPD-220VS performed very well in subjective evaluation, and it handled our test photo images with aplomb.

In subjective testing, the CPD-220VS outscored its mates, posting excellent results on nearly every measure.

A unique feature of this monitor is Sony's new Graphics Picture Enhancement (GPE) technology. Using the front-panel buttons, users can select any of four preset modes customized by Sony for use with standard text screens, presentations, graphics, and MPEG video. Each of the settings has its own level of sharpness, brightness, and color temperature.

On the sound side, the CPD-220VS has a three-speaker system, with two side-mounted 3.5-watt speakers and a 10-watt subwoofer built into the unit's base. The resulting sound quality is quite good, even at fairly high volume levels. The display's front panel has a microphone, switches for a three-level bass boost, and a mute button (very handy when that pesky phone rings).

If multimedia is an important consideration for your next purchase, look no further than the Sony Multiscan CPD-220VS. All three Multiscan models are strong performers and should be on your short list.—*BB and JB*

Televideo SVP260 SuperView Pro

SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,152-by-870 maximum recommended resolution (92-Hz refresh), 1,600-by-1,200 maximum resolution (66-Hz refresh). $720 street.*

TeleVideo's SVP260 SuperView Pro is a

MEET THE PERFECT PARTNER FOR BUSINESS TRAVEL. AT AN ECONOMY FARE.

When it comes to notebook performance, the new Compaq Armada 1530DM really soars above the rest. For starters, it has a powerful 133MHz Pentium® processor with MMX™ technology and 16MB EDO RAM expandable to 80MB. Plus, it has an integrated modem and integrated AC adapter. Even better, the Armada 1530DM allows you to easily access your hard drive, floppy drive, and CD-ROM drive simultaneously.

The Armada 1530DM also includes the quality and reliability you'll find only in a Compaq. So call today and get everything you need to manage your business—at home or on the road—without compromising your budget. At $2,499* it's a first-class deal.

Compaq Armada 1530DM ◆ $2,499*

- 133MHz Pentium® processor with MMX™ technology and 256K L2 Cache
- 16MB EDO RAM (expandable up to 80MB)
- 1.4GB Hard Drive
- 12.1" CSTN SVGA Color Display
- Integrated Components:
  10X CD-ROM
  3.5" 1.44MB Diskette Drive
  AC Adapter
  33.6Kbps Data/Fax Modem
- Two 32-Bit CardBus Type II Slots (or one Type III)
- Li-Ion Battery (also supports Enhanced Smart NiMH)
- Dual Bay Supports Floppy Drive or 2nd Battery for up to 6 Hours of Battery Life**
- Windows® 95 or Windows NT 4.0
- 1-Year Worldwide Limited Warranty†

COMPAQ

1-800-345-1518
For Your Nearest Compaq Authorized Reseller
Or Visit Us At www.compaq.com

MMX intel inside pentium®

*All prices shown are estimated street prices. Reseller prices may vary. Other models are available. Battery packs and certain options are covered by a One-Year Limited Warranty. **Battery life is estimated based on normal usage and with advanced power management. †The Compaq Armada is covered by a One-Year Worldwide Limited Warranty with pick-up/carry-in service. Offer available in the U.S. only. ©1997 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo registered U.S. Patent and Trademark Office. Products, prices and programs are subject to change without notice. Windows is a registered trademark of Microsoft Corporation. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Other products are trademarks of their respective companies.

fine choice for CAD/CAM applications, as well as for other professional applications where resolution flexibility and well-defined control of image corners are mandatory. With a full complement of user controls, the SuperView Pro is as easy to work with as it is to work on.

The SuperView Pro scored well on both subjective and objective measures. Color attributes and screen geometry were excellent, as was the unit's uniformity. Screen focus didn't seem quite as sharp as on some other monitors, but the problem was not pronounced enough to be worrisome.

A single control button lets you easily toggle to and adjust a range of settings, including individual controls for horizontal and vertical convergence, a nice addition. The SuperView Pro is particularly good for applications where tight color image control is paramount.—*BB*

Toshiba TekBright 700PM

SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,152-by-870 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (60-Hz refresh). $750 street.*

The TekBright 700PM, Toshiba America Information Systems' first branded monitor, uses the company's proprietary Microfilter technology to increase brightness and color purity. Intended for multimedia development applications, videoconferencing, and interactive training, the multipurpose TekBright is a solid value for those markets.

One of the TekBright's unique features, the Toshiba Monitor Control software utility, enables you to make all changes to the display settings on your PC. Because there are no physical controls, however, we were not able to test the monitor with the equipment used for objective performance measurement. The only physical controls are for brightness, contrast, and image positioning.

On our subjective test suite, the TekBright was a standout. We noted very tight geometry, with great focus and clear, rich colors. The unit comes with integrated speakers offering 5 watts per channel. An admirable performer, the TekBright is a good choice for users who are ready for a cutting-edge multimedia monitor.—*BB*

Utobia XP400

SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,024-by-768 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (60-Hz refresh). $630 street.*

The Utobia XP400, from Utobia Corp., is an aggressively priced monitor ideal for mainstream users who want a well-performing aperture-grille unit for a reasonable price. Refresh rates at its top resolutions are a bit too limited for everyday CAD and professional graphics work, but users who work at high-resolution tasks only occasionally should be pleased.

The XP400 produced above-average performance scores on both objective and subjective tests. Focus and color were very good, geometry was fine, and there was no noticeable misconvergence. We did notice regulation problems, but not so severe as to be a drawback.

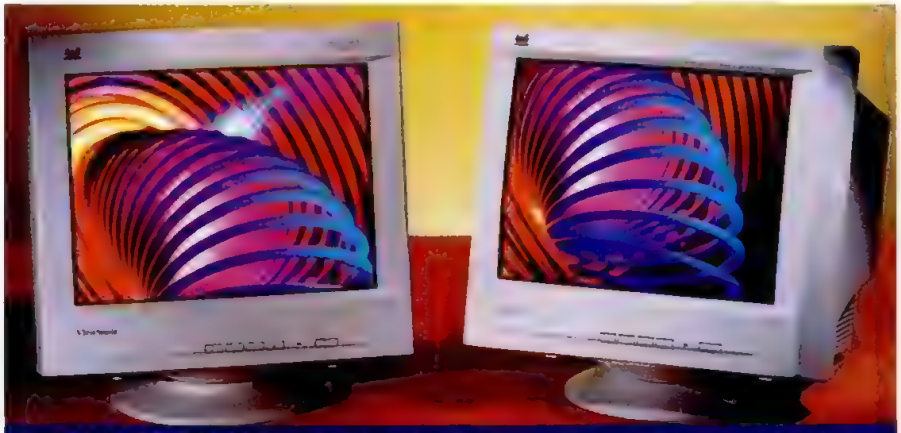
The Utobia XP400 is a good choice for general-purpose use but less strong for professional applications, due only to its lack of support for high refresh rates at its maximum resolution.—*BB*

ViewSonic G771, PT775

G771 SPECIFICATIONS: *17-inch Invar shadow-mask tube (0.27-mm dot pitch), 1,024-by-768 maximum recommended resolution (87-Hz refresh), 1,280-by-1,024 maximum resolution (66-Hz refresh). $620 street.*
PT775 SPECIFICATIONS: *17-inch aperture-grille tube (0.25-mm stripe pitch), 1,280-by-1,024 maximum recommended resolution (89-Hz refresh), 1,600-by-1,200 maximum resolution (77-Hz refresh). $850 street.*

ViewSonic Corp.'s two new 17-inch monitors are strong values for their respective target buyers. The ViewSonic G771 performs very well and is appropriate for general business and SOHO settings. The ViewSonic PT775, equipped with an aperture-grille tube, delivers higher resolution support and even better performance for demanding professional-market CAD and graphics users.

The G771 was outstanding in subjective testing—a strong performer in all areas. Geometry, focus, color attributes, and text handling were all top-notch. The PT775 had an equally strong showing on our subjective test suite, and in objective testing it garnered one of the best overall MonMark scores. The only noticeable subjective test quibble was minor regulation pulsing and a little streaking, but otherwise the PT775 is a great display with particularly rich colors.



VIEWSONIC G771, PT775 Both of these units offer prospective buyers a good value for the money, but the PT775 stood out for its rich colors and crisp text handling on subjective tests.

Both ViewSonic displays use an intuitive four-button setup for user controls. The higher-end PT775 adds a convergence adjustment and moiré cancellation, as well as a BNC cable connector to hook up a second system.

The ViewSonic G771 is a solid buy for general business applications. The PT775, clearly a high-performance monitor, is right for rigorous professional use.—*BB*

19-Inch Monitors

Cornerstone Color 45/101sf

SPECIFICATIONS: *19-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (89-Hz refresh), 1,600-by-1,200 maximum resolution (81-Hz refresh). $1,295 street.*

Cornerstone Imaging specializes in high-performance monitors for document imaging and other text-intensive applica-

Still trying to decide

when to buy

a 56K modem?

Let us make it easy for you.

Now get

$50

cash back.

$50 (US) rebate offer replaces previous free month of ISP service (up to $25 US) for U. S. Robotics desktop modems only. Original free month of ISP service offer still applies to Megahertz® 56K PC Card modems models XJ1560, CC1560, XJ5560 and CC5560.

1 [illegible]

2 [illegible]

3 [illegible]

©19[illegible] [illegible] product names are [illegible]

x2™ Delivers...even more.

x2 Delivers...cash back and more

Every day, more and more information is added to the Internet. Like bigger data files, and richer graphics. You're going to need a faster modem than the 28.8K and 33.6K models out there now.

That's why we're making it easier for you to get the x2 technology 56K[1] modem, the fastest ever created for use with regular phone lines – by giving you $50 (US) cash back.

x2 Delivers...high download speeds now

You don't need to wait to take advantage of this modem's superior download speeds. That's because x2 technology has already received the support of more than 800 Internet service providers (ISPs), from industry giants like IBM Global Services, America Online, Prodigy and NETCOM to smaller regional providers. In fact, more than 700 of them are live today, offering local access. That means you can start downloading at high speeds in all 50 states right now with x2.[2] It's that simple.

x2 Delivers...free upgrade to standard

You may have heard that the international 56K modem standard hasn't yet been defined (expected in 1998). That's why we're offering a no-risk guarantee of a free upgrade to make your x2 modem meet this new standard after it's approved. And since x2 uses DSP Solutions technology from Texas Instruments, it can easily be software upgraded to receive future performance enhancements as they're developed.

x2 Delivers...guaranteed

To make it easier for you to experience x2 technology now, we're introducing "x2 Delivers More," a special program that will show you why buying an x2 modem now makes so much sense.

Delivers ...more!

$50 (US) CASH BACK

Now, instead of a free month of Internet service, we're offering a $50 (US) mail-in rebate when you purchase a U.S. Robotics x2 technology 56K desktop modem by 10/4/97. It's a great way to help you get even more out of the Internet.

CONNECT NOW in all 50 states and Canada

Right now, more than 700 ISPs are live with x2, so you can connect regardless of where you live.

FREE UPGRADE to standard[3]

After the new 56K ITU-T standard is approved, we'll upgrade your U.S. Robotics x2 technology 56K modem to meet it – absolutely free.

30-DAY money-back guarantee

We're confident you'll be completely satisfied with your new x2 modem. If not, you can return it with your dated receipt within 30 days of purchase – no questions asked.

See the back cover for complete details of the x2 Delivers More program.

x2 Delivers...an easy choice

The ability to connect now in all 50 states and Canada. $50 (US) cash back. A free upgrade to standard. A 30-day money-back guarantee. It simply couldn't be any easier. For more information, visit our Web site at **http://x2.usr.com/connectnow**, or call **1-800-525-USR1** to find an ISP near you that offers live x2 service.

Now download at high speeds with the company that connects more people to the Internet than any other. To get the speed you need, just remember one thing: x2 delivers even more than before.

U.S. Robotics®

x TECHNOLOGY

U.S. Robotics. From the leader in networking. 3Com

$50 (US) CASH BACK WHEN YOU BUY x2 TECHNOLOGY NOW
CONNECT NOW WITH MORE THAN 700 LIVE ISPs NATIONWIDE
FREE UPGRADE TO 56K ITU-T STANDARD
30-DAY MONEY-BACK GUARANTEE

Buy any Sportster® or Courier™ 56K modem with x2™ technology between July 1 and October 4, 1997 and get $50 (US) cash back plus upgrade to 56K ITU-T standard, FREE. And if you're not satisfied after 30 days you can return the modem for a full refund.

U.S. Robotics x2 $50 Cash Back
TECHNOLOGY
TO HELP ENHANCE YOUR INTERNET EXPERIENCE

Get $50 (US) cash back from U.S. Robotics

U.S. Robotics, x2 Delivers More, PO Box 8131, Young America, MN 55551-8131

Name

Address

City **State/Prov** **ZIP/Post**

Phone **E-mail Address**

Retailer / Mail Order Reseller where modem purchased

Not valid with any other offer.

UPC SAMPLE

XXXXX XXXXX

SERIAL NUMBER SAMPLE

The following UPC codes are the only acceptable codes for this offer. No other UPC codes are valid. Tape UPC bar code over this box.

7-38168-00611-3	7-38168-00612-0	7-38168-00613-7	7-38168-00614-4
7-38168-00615-1	7-38168-00616-8	7-38168-00630-4	7-38168-00629-8
7-38168-00682-3	7-36168-00686-1	7-36168-00669-4	7-36168-00670-0
7-36168-00687-8			

Tape serial number & bar code over this box

tions. The high-resolution flexibility—and high price tag—of the Cornerstone Color 45/101sf reflect this premium positioning. Using our standard graphics accelerator, image quality was on a par with that of the other 19-inch models we tested. Cornerstone offers dedicated graphics cards ($267 to $309 street) to get the most from the monitor, which might make the unit the right choice for specialty applications.

In subjective testing, the Color 45/101sf did the best job of all the tested units on the color photograph; the other 19-inch monitors tended to produce lower contrast and more faded colors. It had a few noticeable weaknesses: There was a visible effect on the black-level shift test, and some pronounced moiré patterns. Its MonMark score was average, but its MTF and Misconvergence subtest results were excellent, which bodes well for text applications. We did, however, record an unacceptable amount of horizontal pincushioning.

Cornerstone offers more corporate support options than most competitors, including rapid replacement of failed units, and even free on-site spares for customers who buy in quantity. If text is your game, the Color 45/101sf is worth a tryout. For more general applications, keep reading.—*AP*

Gateway 2000 EV900

SPECIFICATIONS: *19-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,152-by-870 maximum recommended resolution (93-Hz refresh), 1,600-by-1,200 maximum resolution (68-Hz refresh). $675 direct.*

The Gateway 2000 EV900 is priced below some 17-inch units in this roundup, making it the value leader in its class. Unfortunately, it is sold only to customers buying a new Gateway 2000 PC or to previous customers already in the company's database.

GATEWAY EV900 A bargain for its class, the EV900 brings adequate image quality to the business market.

On our subjective tests, the image showed almost no moiré patterns and very few discernible convergence problems. There was a pronounced jump in image size during the screen-regulation test, and a noticeable shift in gray levels in the black-level shift test. The photographic image also had a slightly green tint, though this was noticeable only in comparison with adjacent monitors. The objective MonMark score was average, and the Misconvergence, Pincushioning, and Luminance Variance subscores were especially strong.

Changing settings is fairly easy, through the use of an unusual digital roller control that is concealed behind a front-panel hatch. You can configure a typical set of attributes, including a particularly effective moiré control.

The EV900's image quality may not be up to snuff for professional graphic artists, but for general use it should work well. With its aggressive pricing, it is not only the value leader among 19-inch models but stands to steal market share from 17-inch models as well—provided, of course, that you're buying from Gateway anyway.—*AP*

NSA/Hitachi SuperScan Elite 751

SPECIFICATIONS: *19-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (75-Hz refresh). $1,000 street.*

NSA/Hitachi's sister company, Hitachi, invented the picture tube that made this class of monitor possible, so it's not surprising that the SuperScan Elite 751 is the best implementation of it we tested. It's a good choice for corporate users and DTP professionals who want to trade up to a 19-inch model.

The SuperScan's image quality was among the best in its class. In subjective testing, image geometry looked perfect, the screen-regulation test showed only slight size shifts, and there were only slight errors in convergence. The weak point was that the photographic image colors looked a bit washed out, though details were crisp. During objective testing the SuperScan fared even better, posting the second-highest MonMark score among 19-inch units and top-notch performance on the MTF, Misconvergence, Horizontal Pincushioning, and Luminance Variance tests.

NSA/HITACHI SUPERSCAN ELITE 751 Awkward front-panel controls didn't hurt this unit's great test scores.

One minor complaint: The front panel holds a dozen poorly labeled control buttons, some of which combine multiple functions awkwardly. The controls do give access to a wide range of adjustments, however, including individual color channel settings. All in all, the SuperScan Elite 751 represents an attractive value.—*AP*

Philips Brilliance 109

Specifications: *19-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (75-Hz refresh). $1,200 street.*

Philips Consumer Electronics' Brilliance 109 is one of the most expensive units in this roundup. Though it has multimedia features that justify some of the extra cost, its image quality lagged behind that of some of the other monitors we saw.

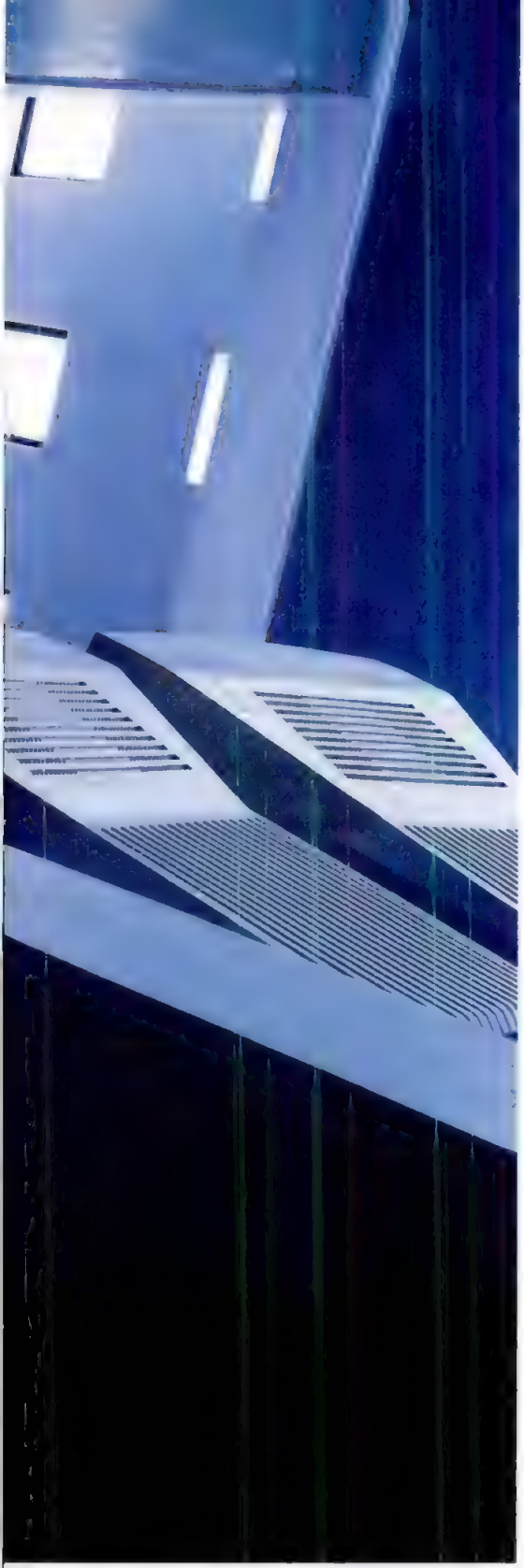
In subjective testing, there were small but noticeable flaws in screen geometry, convergence, moiré patterns, and the image bandwidth test. None of these flaws are major problems for typical use, but taken together they add up to an image

HOW POWERFUL IS THE NEW DELL WORKSTATION?

intel inside

pentium II processor

Mini-tower chassis anticipated to ship 9/97 (although customers can order now). ★Prices and specifications valid in the U.S. only and subject to change without notice. †For a complete copy of our limited warranties, please write Dell USA L.P., One Dell Way, Round Rock, TX 78682. Attn: Warranties. Δ On-site service provided by third-party providers and may not be available in certain remote areas. 3Com and EtherLink are registered trademarks of 3Com Corporation. ©Copyright 1997, Standard Performance Evaluation Corporation. Information value correct as of print date. Intel, the Intel Inside logo and Pentium are registered trademarks of Intel Corporation. Windows and Windows NT are registered trademarks of Microsoft Corp. ©1997 Dell Computer Corp. All rights reserved.



FINANCIAL SERVICES DUAL MONITOR WORKSTATION

DELL® WORKSTATION 400M
DUAL 300MHz PENTIUM® II PROCESSORS

- 128MB ECC EDO MEMORY
- 4GB Ultra/Wide SCSI-3 Hard Drive (7200 RPM)
- APPIAN Jeronimo J2 Graphics Card
- 24X Max/12X Min EIDE CD-ROM Drive
- Sound Blaster Audio Controller
- Integrated 3Com Fast EtherLink XL
- Factory Installed Windows NT® 4.0 with 1 Year Telephone Support
- Two 1000LS Monitors (15.9" v.i.s.)
- 3.5" Floppy Drive
- 3 Year Limited Warranty[1] with 1 Year NBD On-site[A] Service

★ ***Upgrade to 3 Years of NBD On-site Service for $99.***

PICTURED SYSTEM

$7379
Order Code: 900002

ADVANCED APPLICATIONS WORKSTATION

DELL WORKSTATION 400M
266MHz PENTIUM II PROCESSOR
(Dual Processor Capable)

- 64MB ECC EDO Memory
- 2GB Ultra-Wide SCSI-3 Hard Drive (7200 RPM)
- Matrox Millennium PCI with 4MB Video Memory
- 24X Max/12X Min EIDE CD-ROM Drive
- Sound Blaster Audio Controller
- Integrated 3Com Fast EtherLink XL
- Factory Installed Windows NT 4.0 with 1 Year Telephone Support
- 1000LS Monitor (15.9" v.i.s.)
- 3.5" Floppy Drive
- 3 Year Limited Warranty with 1 Year NBD On-site Service

★ ***Upgrade to 3 Years of NBD On-site Service for $99.***

$3899
Order Code: 900000

Dell's expertise in industry-standard technology gives the Dell WorkStation 400 a price/ performance edge over selected models from significant competitors, as shown below. These tables reflect a 3D-graphics-oriented benchmark modeling an environment similar to mechanical CAD.

Viewperf CDRS Benchmark[©] Test Workstations – Relative Price Performance[1]		
Dell	WorkStation 400 266MHz w/ELSA Gloria-M Glint MX	$195
IBM®	IntelliStation M Pro Model 26U INGR w/Intense 3D Pro 1000	$220
SGI	O2 R5000/180MHz SCO2	$533
Sun Ultra	Ultra 1 Creator3D Model 170E w/Creator3D	$446
Digital	Personal Workstation 266i w/AccelGraphics AccelPro 2500TX	$624
SGI	Octane 1x175MHz R10000 SI w/Tram	$922

[1]Price per composite score. Lower number indicates greater price value. For more in-depth information, refer to www.specbench.org/gpc/opc/opc.cdrs.summary.html.

Fasten your seatbelts. Because the Dell Workstation 400 is going to rock the entire industry. You see, it's more than just a multitasking powerhouse. It just may represent the end of your being held hostage to RISC processors, proprietary operating systems and the ransom of exorbitant operating costs. Developed in close association with key applications developers, it's here to overturn the workstation establishment. (Remember what we did for desktops and portables?) Which means the Dell Workstation 400 isn't just available with dual 300MHz Pentium® II processors, the fastest Intel® processors for enhanced CAD and 3D graphic performance. It's available at a price point that few companies have the business model to match. Giving you the benefits of supreme compatibility testing, hardware certification, performance measuring and hardware/software support. Want more? Visit us on the Web or give us a call.

TO ORDER TOLL-FREE
800-348-8356
TO ORDER ONLINE
www.dell.com

Mon-Fri 7am-9pm CT
Sat 10am-6pm CT
Sun 12pm-5pm CT
In Canada,* call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04548

DELL®

PHILIPS BRILLIANCE 109 Expensive for its class, this multimedia unit provides average image quality.

that is somewhat disappointing considering the unit's high price. On our objective test suite, the Brilliance turned in average performance overall.

The front-panel controls are a bit more tedious than in some other designs, and the power switch is awkwardly located on top of the monitor. There is a built-in microphone, a set of good built-in speakers, and an array of jacks and audio controls. Philips also offers a four-port USB add-on ($50).

The multimedia features of the Brilliance 109 set it apart from the field, but so do its higher price and lower image quality. Unless you need the extra features, you can get a better bargain elsewhere.—*AP*

PiXie 995

SPECIFICATIONS: *19-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (85-Hz refresh), 1,600-by-1,200 maximum resolution (75-Hz refresh). $900 street.*

PiXie Technologies' PiXie 995 proves that sometimes fine objective test scores don't translate into top-notch image quality. Though it's a bargain in the 19-inch class, this iteration asks you to make too many trade-offs to be worth the savings.

In spite of a first-place MonMark score and some excellent subtest results, the PiXie 995 did not fare well on our subjective evaulations. We noticed a significant misconvergence problem in the lower corners (borne out by an unusually high Misconvergence score), as well as noticeable flaws in image geometry and pronounced moiré patterns.

Setup and configuration are relatively easy, though the meaning of the on-screen menu icons is not always obvious. The monitor comes with a built-in microphone; stereo speakers are available as an option ($50), as is a four-port USB hub add-on ($50). Despite some useful external features, this unit's image quality is not up to the level of its competition.—*AP*

Princeton EO90

SPECIFICATIONS: *19-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (86-Hz refresh), 1,600-by-1,200 maximum resolution (75-Hz refresh). $850 street.*

Princeton Graphic Systems takes aim at the general corporate market and SOHO users with its new Princeton EO90 monitor. The unit was not a performance standout, but its acceptable

image quality and moderate price make it worthy of consideration for everyday business chores.

The Princeton fared better than average among 19-inch contenders in subjective analysis. We noticed no problems with convergence or moiré montages, but there were noticeable flaws in the screen geometry, as well as size changes during the image-regulation test. Middling test scores lowered its overall MonMark score on our objective test suite, though no results were unacceptable.

The Princeton has the same front-panel arrangement and on-screen menu system as the Sampo AlphaScan 810 (also reviewed in this roundup), and it even has the same little buttons shaped like dog bones. The buttons have a slightly confusing mix of functions, but the on-screen text prompts make them easier to use.

The Princeton EO90 is a reliable, aggressively priced monitor that is an attractive value for business and small-office users looking for an alternative to a 17-inch monitor.—*AP*

Sampo AlphaScan 810

SPECIFICATIONS: *19-inch Invar shadow-mask tube (0.26-mm dot pitch), 1,280-by-1,024 maximum recommended resolution (88-Hz refresh), 1,600-by-1,200 maximum resolution (80-Hz refresh). $820 street.*

Sampo Technology positions its capable AlphaScan 810 to compete in the CAD, desktop publishing, and graphics markets. But it provides a better value for business users than for high-end graphics professionals.

The AlphaScan 810 performed well on our subjective tests, except for a few noticeable flaws in the image geometry and pronounced moiré patterns on some test images. Our objective evaluation revealed some strengths on the MTF, Misconvergence, pincushioning, and Luminance Variance tests. The AlphaScan 810's overall MonMark score was below average, though not by much.

Setup and configuration of this unit are relatively easy, though the buttons, shaped like dog bones, have multiple functions that can be confusing. Well-executed text prompts for the on-screen menu help ease the process.

The AlphaScan 810 produces good images for an attractive price, but it lacks the panache necessary for its intended market of high-end graphics professionals. It will surely find plenty of use in the wider market of general users.—*AP* PC

PRINCETON EO90 Bargain-priced for corporate and SOHO users, the EO90 performed solidly on our tests.

Breakthrough Price

"We definitely need large screen displays to run our graphics programs. However, there isn't room in our small office for big 21" (various viewables) monitors. When we saw the 19" (18.0" viewable) Optiquest V95, we knew we'd found a winner."

Talk about breakthrough size! Optiquest® took the concept of a large screen 21" (various viewable) monitor, combined it with the small footprint of a 17" (various viewable), and created a brand new display – **the 19" (18.0" viewable) V95 monitor.**

Imagine! A screen large enough to handle graphics, business and Internet applications for PC and Mac® systems, yet small enough to fit into the limited space of a small office. In fact, the 19" (18.0" viewable) Optiquest V95 delivers the best of a traditional 21" (various viewable) screen, but costs approximately 45% less.

This display offers impressive performance with its 1,600 x 1,280 maximum resolution, 95kHz horizontal scan rate, super fine 0.26mm dot pitch for sharp, crisp images and a flat square screen. And it also includes OnView® controls for simple on-screen adjustments – all at the affordable Optiquest price. Plus it's backed by a limited three-year warranty.

Why settle for less? Get the best of both worlds – large screen performance in a small footprint. **Call 800-843-6784**, ask for agent 6587 to obtain the name of the dealer nearest you.

All business decisions should be this easy!

OPTIQUEST.

A ViewSonic® Company

438 Cheryl Lane, Walnut, CA 91789
(800) 843-6784
Internet:www.optiquest.com

Corporate names and trademarks stated herein are property of their respective companies.
Specifications subject to change without notice
Copyright © 1997, ViewSonic Corporation. All rights reserved

CIRCLE 117 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

The Complete Video Desktop

By Jan Ozer

Video isn't just for the pros anymore. We'll show you the best products to help make your video projects come to life using your PC.

It wasn't long ago that video on the desktop was more fiction than fact. But, with new technology and advances in hardware and software, desktop video has become a reality. With digital video moving toward center stage, there are more choices than ever for capturing, editing, and delivering video using your PC.

Unfortunately, with freedom of choice comes some confusion, especially with a technology that is still developing. To transfer video to your PC, you'll need a video capture board. Few capture boards are good for all video projects, and which one you should choose depends on where the video is coming from and where you're planning to send it. Once you get it into the PC, you need video-editing software. Most boards come with their own bundled editors, but you may want to choose one better suited to your skills and to the task at hand. Throw in digital cameras, FireWire capture boards, inexpensive analog tape editors, and so on, and the picture becomes quite cloudy. This story sorts out the options and helps you find the best desktop video-editing solution.

Where should you begin? To borrow a line from Stephen Covey (of *Seven Habits of Highly Effective People* fame), "Begin with the end in mind." In other words, to pick the proper toolset, start by considering how you plan to distribute your video. Whether you plan to print video to tape, encode it for CD-ROM titles, or put it on the Internet or an intranet will help

Video Editing

Video-editing software allows desktop PCs to perform tasks once restricted to expensive workstations. Until recently, there weren't many desktop video editors from which to choose

But that's beginning to change. We've divided our coverage into entry-level and midrange products. All six programs reviewed here can handle the basics—trimming and sequencing video and multimedia clips, and applying transitions and effects. The midrange products boast stronger feature sets, but the entry-level programs are easier to use

Video Capture

The process of getting video from a camcorder or VCR into your PC can be complex. In most cases, it involves the conversion of analog video to a digital format. For that, you

need a capture board. We review nine mainstream video capture boards. Some handle a variety of tasks including nonlinear editing for output back to tape, while others are better suited for video that will be compressed for distribution on a CD-ROM or across the Internet. In addition, we look at hardware MPEG encoders and FireWire boards

ILLUSTRATIONS BY ANDREW SHACHAT

determine which hardware and software you should use.

The first decision is whether you plan to distribute your video in analog format (as VCR or Hi-8 tapes) or digitally (via CD-ROM, from a hard disk, or over the Web). If you plan to capture video for digital distribution, you can go pretty far with a $200 capture board and a spacious SCSI drive. But if you would like to send video back out to tape, the rules are a little tougher, and you'll need to spend more to get the right equipment.

TALE OF THE TAPE

If you're thinking of distributing video on tape, your capture board must have VGA-to-NTSC output ports to transfer video back to the analog source. In "Video Capture," also in this issue, we review six boards, ranging from $400 to just under $1,000, that provide these functions. Graphics board vendors, specifically ATI Technologies and Matrox Graphics, are also getting into the act with capture daughterboards offered at aggressive prices.

Like all video development, creating video for output to tape (or nonlinear editing) typically involves three steps: capturing the video to disk; editing to add titles, transitions, and special effects; and rendering the finished video for transfer out to tape. When developing for output to tape, you typically work with 640-by-480 (full-screen) files captured at the highest possible data rate, which can exceed 6 MBps.

Nearly all boards in this category ship with their own bundled video editors; in theory, you should be able to use any .AVI editor with any .AVI capture board. We say "in theory" because, as we learned during testing for "Video Editing," not all software programs work equally well with all capture boards.

From a production standpoint, the video editor has at least as much impact on output quality and production efficiency as the capture board, if not more. The six video-editing packages we review can be categorized into two sections: entry-level and midrange. Besides being less expensive, entry-level packages are easier to use. MGI VideoWave, for example, has a simple storyboard interface that makes editing a drag-and-drop process. But these products lack some of the power features found in midrange video editors such as Adobe Premiere 4.2. Since many of the capture boards we reviewed include versions of these video editors, you can refer to the software reviews to help guide your hardware buying decision.

CAPTURE FOR COMPRESSION

When capturing for distribution on CD-ROM or over the Internet, you can use any of the six boards reviewed in the story "Video Capture." But less expensive boards, such as the Intel Smart Video Recorder III ($199 list), excel at such tasks. To prepare video for distribution on the Internet, you generally capture, edit, and render in .AVI format, and then compress the output file with a proprietary, standalone program like Progressive Networks' RealVideo encoder, which we used to compress files for our jury tests. If your video is CD-ROM–based, you can also use these boards to capture for encoding into Cinepak or Indeo Video Interactive (IVI) format, since both codecs are freely available.

As computers get faster, the MPEG-1 compression format is gaining popularity. MPEG-1 offers better quality than other codecs and can play back at close to 30 frames per second (fps) on a Pentium/133 computer without any special hardware.

You can create MPEG-1 files using a traditional .AVI capture board and a software encoder like the Xing MPEG Encoder (used for our MPEG-1 jury tests), but this takes both time and disk space.

When you need to create larger MPEG-1 files or to encode MPEG-1 files more quickly than software encoders will allow, consider one of the five real-time MPEG-1 encoders covered in "MPEG Encoders." These encoders vary in price from about $400 to $1,500. Several boards also support two-pass encoding. In two-pass mode, the board first captures the video as an .AVI file (which can be edited using any video-

GLOSSARY

Video Verbiage

A/B roll Video that is compiled from two sources, designated as tracks A and B or tracks 1 and 2

Anti-aliasing Smoothing the jagged edges of curves and diagonal lines in bitmapped images.

CD-ROM padding Matching an .AVI file to the 2K sectors of a CD for smoother playback.

Chrominance The color dimension of video

Codec The compression/decompression algorithm used to encode the video data in an .AVI file

Composite video A format in which chrominance and luminance are transmitted by a single signal

Compositing A process in which a video segment is superimposed over one or more video segments and they are subsequently compiled into a single file

Edit decision list (EDL) A list of video-editing instructions that can be exported to professional analog editing devices

In/out markers Notations in digital video or audio clips to denote where they should begin and end

Key A type of overlay in which portions of a foreground video are made transparent.

Keyframe In a digital video file, a frame containing a complete image that relies exclusively on intraframe compression. In animation or motion effects, a frame created whenever an attribute is changed

Luminance The brightness of a video signal.

MPEG (Motion Picture Experts Group) A video-compression scheme that allows for full-screen, full-motion video capture and playback

NTSC (National Television Standards Committee) North America's video signal specification

Ripple and rolling edits Methods of video manipulation. When elements are inserted or deleted, a *ripple edit* automatically moves all subsequent elements on the timeline. A *rolling edit* trims or overwrites subsequent clips to maintain the total duration of the project.

Rotoscoping The technique of drawing or painting on individual frames of a video clip.

SMPTE (Society of Motion Picture and Television Engineers) A scheme that designates each frame in a video (hours.minutes.seconds:frame)

Subpixel positioning A rendering technique used to preserve the visual integrity of raster images as they are moved or rotated in 3-D space

S-Video A video format that separates the chrominance and luminance values of a video into two separate signals, producing better-quality video

Digital Video from Analog to Output

CAMERA *All video development starts with the camera. The type of camera you choose will have a major impact on output quality.*

Analog cameras. Until very recently, all cameras were analog in design, sending analog signals such as S-Video or composite to capture boards for digitization. Most camcorders in use today are analog-based.

Digital cameras. One of the most significant trends in videography is the appearance of digital video camcorders, which digitize the video information on acquisition and store the audio/video information in digital format. See the sidebar "Seeing Digital" for more on digital video camcorders. Although digital cameras also output in analog formats for compatibility with legacy capture boards, you'll need a FireWire-based capture board to download digital information from the camera to the computer. See "FireWire Boards" for reviews of two of the first boards for transferring digital video to PCs.

CAPTURE *Capture boards convert analog signals from the camera into digital format..*

Capture for nonlinear editing. The main focus of our story "Video Capture," nonlinear capture boards can perform both capture for output to tape and capture for compression, providing maximum flexibility.

Capture for compression. For capture solely for output in digital format, you can purchase a capture board that does not support nonlinear editing, such as Intel's Smart Video Recorder III. These boards are also covered in "Video Capture."

MPEG encoding. Publishers working solely with the MPEG-1 format should consider real-time encoders that capture and convert to MPEG-1 format in a single step. See "MPEG Encoders" for full reviews of real-time and two-pass encoders.

Digital video transfer. If you have a digital camera, you can use its FireWire connection to transfer digital video to a FireWire-based board in your computer, enabling a totally lossless transfer (no quality degradation) of digital files from camera to computer. See "FireWire Boards" for the product reviews.

EDITING *Once a monolithic market, this category has expanded to include products for different users, budgets, and video tasks.*

Timeline editors. Traditional desktop video editors use a timeline approach—laying out the various audio and video clips on different tracks for precision synchronization. See the story "Video Editing" for reviews of timeline-based editors.

Storyboard editors. With new storyboard editors such as MGI VideoWave, if you can operate a VCR, you can produce digital video. "Video Editing" also covers such editors.

Analog editors. Analog editors are designed to circumvent the hardware and software requirements of a digital video-editing solution. See the sidebar "Still Analog After All These Years" for more on these low-cost editors.

MPEG editors. If you work with significant quantities of MPEG-1 files, the ability to cut and paste clips together will come in handy. Products in this category include Cinax Designs' iFilmEdit and FutureTel's ClipView. The sidebar "Cut-and-Paste Editing" contains more on this new niche.

OUTPUT *In large part, your choice of tools and output format will be directed by how you intend to deliver video to your audience.*

Tape. Output to tape is still the most popular means for distributing video to a wide audience—and it provides the highest resolution. To output to tape, you'll need a capture board with VGA-to-NTSC output capabilities. Such boards are covered in "Video Capture."

CD-ROM. If you're distributing a large quantity of video in MPEG-1 format, consider a real-time MPEG-1 encoder. See "MPEG Encoders" for reviews of such boards. You can also use software encoders such as XingMPEG Encoder to generate MPEG-1 video.

Internet/intranet. Most streaming Internet video products have their own proprietary encoders that accept .AVI files from video capture boards. For a more detailed look at this technology, see "Streaming Video: A Welcome Reception," in this issue.

editing program) and then uses on-board acceleration to compress to MPEG-1 format roughly five times as fast as software-only programs.

As with regular analog-to-digital capture boards, MPEG encoders require an expansion slot and can be tricky to install. Fortunately, an alternative is on its way. Coming to a parallel port near you this fall are at least two external devices that capture MPEG-1 video and transfer it to your hard disk via your parallel port. Priced at well under $500, these devices, from FutureTel and Videonics, are easy to install and can be used with laptop PCs. These products could be the final boost necessary to carry MPEG-1 encoding into the mainstream.

THE DIGITAL DOMAIN

As fast as the pace changes on the desktop, it appears slow compared with the revolution occurring in the video camera arena. Over the past two years, many of the new cameras introduced (from amateur to professional level) have stored their video in digital rather than analog format. As detailed in the sidebar, "Seeing Digital," this has made production-quality video a possibility, with prices from $2,000 to $4,000.

Of course, once you begin recording video in the DV format, you need a way to transfer it to your computer. That's where IEEE 1394, better known as *FireWire*, comes in. FireWire is the high-speed serial-port specification that output ports on digital cameras and decks use to handle the sustained throughput required by digital video. To capture video from these devices, you need a FireWire capture board that supports the DV format. FireWire boards are just beginning to appear on the market, and we review two of the first shipping solutions in "FireWire Boards."

FireWire boards capture in the familiar .AVI format accessible to all .AVI editors and can create video for distribution in both analog and digital form. Together, digital camcorders and FireWire capture boards will deliver the promise of affordable, studio-quality desktop video.

No digital video review is complete without a mention of MPEG-2, the higher-quality sibling of MPEG-1, and DVD, the format that crams seven times as much data onto a CD. These two technologies together allow the video developer to deliver broadcast-quality video to any desktop equipped with an MPEG-2 player and DVD.

MPEG-2 and DVD are exciting technologies, and they may not be long in coming. But whether you plan to create long, high-quality sequences for tape, encode video for playback on PCs from a CD-ROM or hard disk, or distribute your footage across the Internet or an intranet, the tools to do so exist today. The future of desktop video, as our story demonstrates, is now.

Our Contributors: JAN OZER and LUISA SIMONE are contributing editors to *PC Magazine*. BEN Z. GOTTESMAN is a technical director, and DIANE JECKER is a project leader. JOHN MORRIS was the associate editor in charge of this story. GARY MACE (*Garymace@aol.com*), a video consultant, prepared our test tape.

Low cost
video editing
and much more!

Experience the ultimate in digital video for your home or business PC. The new ***Matrox Video, Graphics and TV Kit*** opens the door to the latest in state-of-the-art video editing, blazing 2D/3D performance, and TV on the PC. The upgrade Kit includes the powerful Matrox Rainbow Runner Studio video module, the award winning Matrox Mystique (4 MB) graphics accelerator, and the Matrox Rainbow Runner TV tuner card. With the ***Matrox Video, Graphics and TV Kit*** in your system you will be ready to tackle any video, graphics, or TV application. Plus the Kit comes with over $700 of free software for video editing, video conferencing, photo retouching, 3D games, and much more! With Matrox there are no limits!

As the winner of over 250 awards for our world renowned products, Matrox is the leader in state-of-the-art technology that is reliable and easy to use. Choose the leader in graphics and video. Choose Matrox.

Win!
the ultimate video editing system from Matrox and Tagram
Register at http://www.matrox.com/ultimate

matrox
1-800-471-8339 http://www.matrox.com/mga

Computing BEST July 1997
Windows Stellar July 1997
OVER 250 AWARDS matrox

Comes with over $700 of free software

MediaStudio VDO Photo Express Toy Story Mad Dog Kid's Power Coo SE

Matrox Video, Graphics & TV Kit

Includes 3 PC upgrades:

- Matrox Mystique® 220 (4MB SGRAM)
- Matrox Rainbow Runner Studio
- Matrox Rainbow Runner TV tuner
- Software, cables, and an easy to follow installation poster

Upgrades also sold separately

Features:

- Non-linear MJPEG video editing
- Full resolution capture and compression
- Special 'cut-list' feature saves editing time and up to 50% hard disk space
- Live video conferencing
- MPEG1 hardware playback and software encoding
- Fast 2D Windows
- Explosive 3D gaming on PC or TV
- Watch / record TV on the PC

Save editing time and disk space

Original file 240 MB	With cut list	Without cut list
Compiling video (lower number better)	1:50 min	5:20 min
Total hard disk space used (lower number better)	250 MB	469 MB

2 minute video clip with 2 transitions (2 secs each)

Test run on a P-200 MMX with 32 MB of RAM using a Matrox Mystique 220 (4 MB) and a Matrox Rainbow Runner Studio. Clip was captured and compiled at 704 x 480 resolution with 16 bit stereo 44 KHz.

CIRCLE 380 ON READER SERVICE CARD
OR GO TO WWW.PCMAG.COM/ProductLink

Carbon Copy

lets your users access their office PCs no matter where they are.

And we do mean no matter where.

Being out of the office doesn't have to mean being out of touch – not with Carbon Copy. As thousands of IS professionals know, Microcom's award-winning software lets your users access and control their office PCs, transfer files from one PC to another, even access their office network whether they're at home or on the road. With Microcom's revolutionary new Pocket Carbon Copy, they can use a hand-held PC to control another PC thousands of miles away. The Carbon Copy product family supports all Microsoft operating systems: Windows 95, NT, CE, 3.x and DOS. ***Why not download a free trial version at www.microcom.com/55 or call (800) 283-4750, Dept. 55 for more information.*** *Carbon Copy – because work isn't somewhere your users go, it's something they do.*

microcom
All the Right Connections™

Microsoft Windows NT Windows 95

MERISEL · INGRAM MICRO · GATEWAY DISTRIBUTION · Tech Data · MicroAge

Carbon Copy is available at CompUSA, Egghead, Micro Center Computer City, Evek-tek, Fry's Electronics, PC Connection, MicroWarehouse, CDW and elsewhere. © Microcom, Inc. 1997. All rights reserved. Windows 95 and Windows NT are registered trademarks of Microsoft Corporation.

CIRCLE 145 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

THE COMPLETE VIDEO DESKTOP

Video Editing

These six video-editing programs are designed for users ranging from home consumers to professionals.

By Luisa Simone

Digital video editing was once the province of pros, who used PCs as an environment for trimming and sequencing large amounts of footage and printing it back to analog tape. But faster and less expensive hardware, combined with new technology, has broadened the digital video horizons.

Multimedia authors, game developers, and corporate meeting presenters joined the ranks of video professionals when efficient software codecs made it possible to play back and distribute videos in digital form. Most recently, streaming video codecs have made it possible to generate low-bandwidth videos that can be distributed over the Internet or over an intranet.

As new ways have emerged to distribute video efficiently, software vendors have responded with new, more powerful tools. The range of video-editing packages in this story is a case in point. Corel Lumiere Suite 1.0, MGI VideoWave, and NewSoft's Presto! VideoWorks have targeted home users and enthusiasts with aggressive prices and easy-to-use tools. By contrast, Adobe Premiere 4.2, in:sync's Kohesion 1.0, and Ulead Systems' MediaStudio Pro 5.0 take higher ground, providing robust tools appropriate for corporate and professional use.

All six video-editing packages provide the same core functions, which include capturing video from an analog NTSC source, trimming clips to a specified length, generating A/B rolls and transitions, and outputting to standard Video for Windows (.AVI) codecs or video-

IN THIS REVIEW

Entry-Level

Corel Lumiere Suite 1.0 166

MGI VideoWave 168

Presto! VideoWorks 172

Midrange

Adobe Premiere 4.2 180

Kohesion 1.0 182

MediaStudio Pro 5.0 185

Go online for reviews of other video products and for an interactive view of our performance test results.

tape. We looked at only those programs that run under Microsoft Windows 95 and have street prices of less than $1,000.

Within this framework, we found a lot of variation. For instance, we didn't expect consumer-oriented products to capture video at the highest data rates supported by the miroVideo DC30 *plus* capture board (7.1 MBps)—and they don't. In addition, most entry-level products do not offer precision editing or synchronization tools, primarily because only pros truly need or want these features. Typically, higher-end products consistently employ subpixel positioning and anti-aliasing to improve the final rendered quality of motion, transition, and overlay effects. And while low-cost programs strive to shield users from the underlying technology, higher-end programs expose it in the form of complex controls for handling technology, such as interlaced video fields and recompression.

Two programs in this roundup, MGI VideoWave and MediaStudio Pro 5.0, are the first to take full advantage of MMX processors and the latest rendering technologies. VideoWave even detects the presence of an MMX or Pentium Pro processor and then installs the appropriate versions of Intel's Animation, Image Processing, and Realistic Sound Experience libraries.

When we began testing, we assumed that all video for Windows-compliant editing programs would work with all video for Windows-compliant capture boards. However, during the course of our testing, several products failed to capture high data rates or stereo-quality audio with the Fast A/V Master or the miroVideo DC30 *plus*. This frustrating experience led us to rediscover the appeal of bundled products that guarantee compatibility between the video-editing software and the video-capture hardware.

A number of video products were not included in this roundup. For example, Digital Workshop's VideoTrope broke new ground with its $39 street price, but it does not capture video. The new retail version of Asymetrix's Digital Video Producer was not ready in time for our story. (We reviewed VideoTrope and the licensed version of DVP that was bundled with many video capture boards in the First Looks section of our issue of July 1997.) Macromedia is planning to join the fray next year with a product called Final Cut.

A host of supporting products that are beyond the scope of this article also deserve mention. Artists who need robust keyframe animation and superior compositing functions need look no further than Adobe AfterEffects for Windows. A variety of programs, such as Strata Media Paint, support rotoscoping. Sonic Desktop's SmartSound (bundled with Lumiere and Premiere) automatically composes a sound track based on information you provide such as the length, style, and purpose of music or sound effects.

We like to think of PC Labs as a dress rehearsal. In the course of generating analog footage and a variety of digital video formats, we learned how well each program performs the specific tasks required by nonlinear editing, CD-based movie production, and compression for streaming video. Whether you're producing a training video, designing a multimedia presentation, or adding some excitement to a Web page, we'll help you find the package with the power to create your star production.

ALL REVIEWS BY LUISA SIMONE

Editors' Choice

- Entry-level: MGI VideoWave
- Midrange: Adobe Premiere 4.2

PC MAGAZINE EDITORS' CHOICE

Since our previous feature story on video-editing software (April 11, 1995), the market has gradually expanded along with the processing power and multimedia capabilities of the average desktop. In response, this time we've designated two Editors' Choice products: MGI VideoWave, new to the market, for those just getting started with video editing and Adobe Premiere, Version 4.2, for professional-level desktop video editing.

Although it certainly can't match Premiere feature for feature, MGI VideoWave offers a decent toolset. Its biggest advantage, however, is a well-designed storyboard interface that makes video editing remarkably easy. A filmstrip along the top of VideoWave's main window allows you to arrange clips and transitions in sequence. The single, large preview area is surrounded by a control panel where you capture and edit files.

VideoWave was the only entry-level program to capture video suitable for output back to tape. And it did an excellent job generating output for disk- and CD-based playback.

Adobe Systems' video-editing package made its premiere four years ago and it has dominated the market ever since. The latest version, Adobe Premiere 4.2, lives up to the program's reputation thanks to consistently good output, a solid set of editing tools, and an extensible architecture.

Premiere generated high-quality output for tape, CD-ROM, and streaming video applications. A traditional, timeline-based editor, Premiere offers sophisticated and efficient tools (like ripple and rolling edits and multiple track selection) that make it well-suited for professional editing jobs. If Premiere's many built-in features aren't enough for you, you can enhance the product via numerous plug-ins.

ENTRY-LEVEL

Corel Corp.

Corel Lumiere Suite

Of the entry-level video editors reviewed here, only Corel Lumiere Suite 1.0 ($70 street) employs a traditional timeline-based interface with separate windows

and floating palettes for tools. The Lumiere is chock-full of functions that make working on a complex project more efficient, although most users will find these to be overkill for this category. More important, on our tests, this Version 1.0 video editor didn't capture reliably and exhibited performance problems.

Lumiere's numerous transition and filter effects rival those of higher-cost programs. For example, Lumiere offers a page-turn transition that simulates a cast shadow just like Adobe Premiere 4.2. Unlike either MGI VideoWave or Presto! VideoWorks, Lumiere allows you to apply multiple effects without recompiling the video, thus preserving image quality. You can further enhance a Lumiere project by using the bundled Corel PhotoPaint 6, CorelMotion 3D, and SmartSound Wizard.

Lumiere provides keyframe control over 2-D motion paths. However, the motion filter simulates perspective with distortion, and true 3-D motion can be achieved only via separate filters. The robust titling functions and transparency overlays again outdistance Lumiere's direct competitors, and a good selection of key types make short work of superimpositions. Lumiere employs anti-aliasing for diagonal and circular wipes, chroma key overlays, and motion paths.

Although Lumiere's toolset is impressive, it doesn't make up for the program's lackluster performance. Displaying bitmaps on the timeline slowed the program to a crawl. On simple videos, such as our 1-second cross-dissolve, Lumiere's preview provides near–real-time playback—albeit with dropped frames. Longer sequences containing multiple effects produced useless previews that exhibited severely out-of-sync audios and unacceptable numbers of dropped frames.

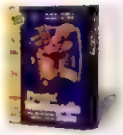
Most products in this category allow you to capture video at data rates higher than they are truly designed to handle by dropping a negligible number of frames. We found Lumiere unstable whenever we attempted to capture at data rates over 5 MBps or in stereo sound.

The problems do not end, however, once you capture the video. Although Lumiere has a thumbnail preview, to determine the true quality of the captured video. you must first save the file to disk. This is unlike other video editors, which allow you to preview a video as a temporary file. When saving to disk, our tests revealed that Lumiere did not interleave the audio properly, resulting in files that could not be imported into miro's .AVI Cache Media Player or even into Lumiere's own editor.

Working with video clips or previously captured files, though, Lumiere performed well, achieving the target data rate for CD-ROM distribution with no trouble. Visual quality was very good, but once again, the audio was slightly out of sync. Lumiere's output interface is quirky. The program allowed us to specify the audio compressor, but the program makes no provisions for important options, such as the CD-ROM padding required by older codecs.

SUITABILITY TO TASK: VIDEO EDITING

ENTRY-LEVEL EDITORS
MIDRANGE EDITORS



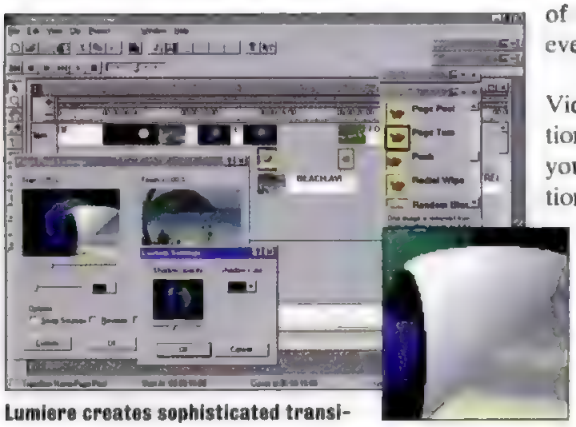
POWER	Corel Lumiere Suite 1.0	MGI VideoWave	Presto! VideoWorks	Adobe Premiere	Kobesion 1.0	MediaStudio Pro 5.0
Capture	Poor	Good	Fair	Good	Fair	Excellent
Editing	Good	Fair	Fair	Excellent	Excellent	Good
Special effects	Excellent	Fair	Fair	Good	Good	Excellent
Output	Fair	Good	Fair	Excellent	Good	Good
EASE OF USE						
Capture	Fair	Good	Good	Good	Fair	Excellent
Editing	Good	Excellent	Good	Good	Fair	Good
Special effects	Excellent	Excellent	Good	Good	Good	Good
Output	Fair	Excellent	Fair	Good	Good	Fair

We rate each product for *power* and *ease of use*. *Power* refers to the strength of the features and *ease of use* addresses their implementation. For the **capture** rating we evaluate the product's data rate, frame rate, ability to preview prior to saving, and video capture card support, as well as the ability to capture from analog format without dropping frames. For **editing** tasks we evaluate the product's ability to handle a variety of file types. We also look at trimming, selection, and synchronization tools; preview functions; rolling and ripple tools; time-stamp control; and audio filters, as well as support for codecs. Under **special effects** we rate the product's transitions, customizable image filters, 3-D effects, titling, motion paths, and chroma key and other matte effects. Finally, for **output** we evaluate sample video in analog (tape) and digital formats (MPEG, streaming video). We take into account compression time, actual data rate, actual frame rate, video quality, and audio syncing.

The PC Labs test-bed consisted of a 200-MHz Micron Millennia equipped with a Pentium MMX processor, 64MB of RAM, a 6GB hard disk, and a Diamond Stealth 3D 2000 video adapter. For capture, we used a miro DC30 *plus* and a FAST AV Master under Windows 95. Our analog video equipment included a Panasonic NTSC-monitor and the Sony EV-S550, a Hi8 deck.

Lumiere is an ambitious program that clearly offers the most features for the money. But its powerful tools make no concessions to the needs of entry-level users, and more significant, its performance problems would discourage even experienced video editors.

Corel Lumiere Suite 1.0. Street price: $70. Requires: Pentium/90-based PC or better, 16MB RAM, 126MB hard disk space, Microsoft Windows 95 or NT 4.0. Corel Corp., Ottawa; 800-772-6735, 613-728-3733; fax, 613-761-9176; www.corel .com. *Circle 513 on reader service card.*



Lumiere creates sophisticated transition effects that rival high-end products like Adobe Premiere. The 3-D Page Curl is shown here.

MGI Software Corp.

MGI VideoWave

MGI Software Corp.'s VideoWave puts a new face on video editing: It looks more like the front panel on a VCR than a standard Windows application. Eschewing menus and dialog boxes, VideoWave ($100 street) relies almost exclusively on icons, sliders, and drag-and-drop functions. Of the editors reviewed here, VideoWave is more limited in terms of features, but it offers almost everything entry-level users need.

A filmstrip along the top of VideoWave's main interface functions as a storyboard, which allows you to arrange clips and transitions in sequence. The single, large preview area is surrounded by an editing control panel where you can capture files, preview videos, trim clips, apply transitions and filters, generate titling and motion sequences, or adjust the audio. The result is a clean, uncluttered, and intuitive work area.

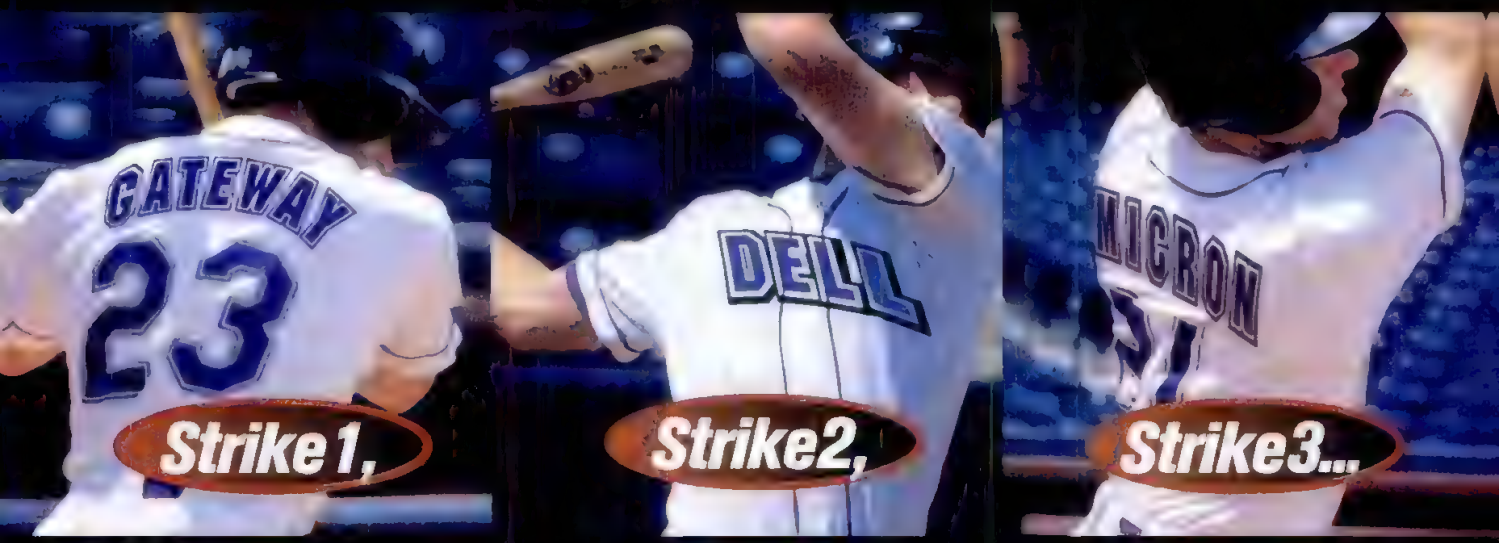
Using the capture board miroVideo DC30 *plus*, VideoWave was the only entry-level program to capture high-resolution, stereo-quality video suitable for output back to analog videotape. VideoWave captured video at up to 5 MBps without dropping frames; most entry-level users will find that data rate quite sufficient.

VideoWave can print to video directly from the editing window, but only if the capture card provides direct access to its drivers. At the moment, this limits print-to-video functions to miro products (as discussed in "Video Capture"). We strongly suggest that you make sure VideoWave is compatible with your video-capture hardware.

VideoWave did an excellent job generating output for disk- and CD-based playback, and it is the only program that we reviewed that can both read and write MPEG-encoded video. However, the output dialog box omits important configuration options. Its streaming video output sounded great, but files were significantly larger than those with the appropriate VDO audio codec.

VideoWave allows you to specify preview performance, which can range from

HEY, GATEWAY, DELL & MICRON...



...THERE'S A NEW TEAM IN TOWN

HERE COMES THE PITCH...

It's a whole new ball game in personal computers today, as Unicent Technologies steps up to the plate with a dazzling new line of computers, boasting power technology and user-friendliness.

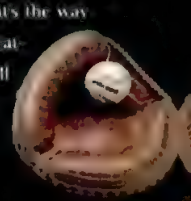
Backed by seven years of making and servicing computers for homes, schools and businesses, Unicent's new line-up is loaded - Pentium II technology, leading-edge peripherals, sophisticated support and competitive prices. And if all that sounds as impressive as the other guys, you've got the right idea!

Plus, we bring a special way of doing business to every product we sell to make your relationship with your Unicent computer the most satisfying it can be - right out of the box.

- *It is easy to set up, easy to understand, easy to use.*
- *It brings you the latest technology and league-leading components for its class.*
- *It is designed to protect your investment by allowing you to easily change and upgrade your computer as you grow with it.*
- *It gives you one of the best guarantees available.*

You will find your Unicent computer so well crafted that you should never need service. But if you do, you can count on us 24 hours a day, every day of the year, to be there with the technical support you need.

We pledge this to you, not only because we believe that trust and partnership are simply good business, but also because it's the way we ourselves would like to be treated. On the next three pages, you'll see how we've loaded the bases. Now, it's your turn at the plate.



LEAGUE-LEADING SYSTEMS

UNICENT AVANTA 266XLP

$2899 *Business Lease As Low as $101/mo

- Intel® 266MHz Pentium® II Processor w/512KB Cache
- 64MB SDRAM (up to 384MB On-Board)
- Tool-Free Tower or Desktop Case
- Ultra DMA/33 IDE controller
- 6.5GB Ultra ATA IDE Hard Drive - 10ms
- 17" Flat Screen NI Monitor
- Matrox Millennium II 8MB WRAM Video
- 24x Toshiba EIDE CD-ROM
- 3.5" Floppy Drive
- Ensoniq™ PCI Wavetable Sound Card
- 2 USB Ports, Amplified Speakers
- 56K X2™ Technology or K56Flex™ Voice Fax Modem Speaker Phone
- Microsoft® IntelliMouse®
- 104-key Win'95 Enhanced Keyboard
- MS Windows '95 CD
- MS Office '97 CD, Internet start-up kit
- 5-Year Warranty and 1-Year On-Site Service

AVANTA 233XLP ***$2779***

MMX intel inside pentium II

• Designed with Intel's 440LX Chipset - Creating the ultimate performance for the latest power hungry applications. This new chipset provides support for ECC RAM, AGP (accelerated graphics port), OnNow, SDRAM, and Ultra DMA/33 Hard Drive protocol, giving users the latest technology available.

AGP

• Featuring Matrox Millennium II - The next revolution in graphics technology is here today. Matrox has once again redefined graphics technology with the Millennium II's new MGA-2164W processor. This sixth generation of the MGA chip is a completely new design of the industry standard 64-bit graphics processor and is complemented by a fast 250MHz RAM DAC and powerful dual-ported WRAM memory. The new Matrox Millennium II offers superior graphics performance for the professional user, delivering optimum acceleration in ultra high resolutions such as 1920 x 1200.

[SEARCHING FOR A GRAND SLAM SYSTEM? INTRODUCING: THE TOP OF OUR LINEUP.]

SYSTEMS

Toshiba DVD-ROM - The next multimedia revolution is at Unicent with the Toshiba DVD-ROM and MPEG-2 hardware compression board for ***$399*** (installed)

US Robotics Bigpicture™ Video Kit-A high quality color camera with built-in microphone for true videophone capability. Video Capture card pulls images from home movies or VCR. Full-Featured 33.6Kbps voice/video faxmodem upgradable to X2™ technology. Features an extensive selection of videophone, VideoFun and online communications software ..... ***$369*** (installed)

Unicent Technologies would like to offer sincere gratitude to the players and staff of the Arizona Aces baseball organization.

The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation.

UNICENT AVANTA

The Quickest, Most Advanced Operation Available.

AVANTA 266XLS

$3599 *Business Lease As Low as $124/mo

- [illegible] Pentium® II 266MHz [illegible]
- 64MB SDRAM, Intel® 440LX Chipset
- 512KB Pipelined burst Cache, Flash BIOS
- Tool-Free Tower or Desktop Case
- [illegible]
- [illegible] • 3.5" FDD
- [illegible]
- Ensoniq™ PCI Wavetable Sound Card
- 56K X2™ Technology or K56Flex Voice Fax Modem, Speaker Phone
- 2 USB Amplified Speakers
- Microsoft® IntelliMouse®
- 104-key Win95 Enhanced Keyboard
- MS Windows NT 4.0 Workstation
- MS Office 97 CD, Internet start-up kit
- [illegible]
- 17" Flat Screen .28 NI Monitor

AVANTA 233XLS $3479

AVANTA 266XLA

$2349 *Business Lease As Low as $80/mo

- [illegible] Pentium® II 266MHz [illegible]
- 32MB SDRAM, [illegible]
- 512KB Pipelined Burst Cache, Flash BIOS
- Tool-Free Tower or Desktop Case
- Enhanced IDE controller
- [illegible]
- [illegible] • 3.5" FDD
- [illegible]
- Ensoniq™ PCI Wavetable Sound Card
- 56K X2™ Technology or K56Flex Voice Fax Modem, Speaker Phone
- 2 USB Amplified Speakers
- Microsoft® IntelliMouse®
- 104-key Win95 Enhanced Keyboard
- MS Windows 95 CD
- MS Office 97 CD, Internet start-up kit
- [illegible]
- 15" Flat Screen .28 NI Monitor

AVANTA 233XLA $2229

UNICENT TITANA

Optimum Power, Speed and Superb Manipulation

TITANA G-233XS

$2499 *Business Lease As Low as $87/mo

- Intel® Pentium 233MHz processor w/MMX™
- 64MB SDRAM [illegible]
- 512KB Pipelined burst Cache, Flash BIOS
- Tool-Free Tower or Desktop Case
- Ultra DMA/33 EIDE controller
- 6.5GB Ultra ATA IDE Hard Drive/10ms
- [illegible] • 3.5" FDD
- [illegible]
- Ensoniq™ PCI Wavetable Sound Card
- 56K X2™ Technology or K56Flex Voice Fax Modem, Speaker Phone
- 2 USB Amplified Speakers
- Microsoft® IntelliMouse®
- 104-key Win95 Enhanced Keyboard
- MS Windows 95 CD
- MS Office 97 CD, Internet start-up kit
- [illegible]
- 17" Flat Screen .28 NI Monitor

TITANA G-200XS $2399
TITANA G-166XS $2299

TITANA G-166XL

$1649 *Business Lease As Low as $57/mo

- Intel® Pentium 166MHz processor w/MMX™
- 32MB SDRAM [illegible]
- 512KB Pipelined Burst Cache, Flash BIOS
- Tool-Free Tower or Desktop Case
- Ultra DMA/33 EIDE controller
- 3.2GB Ultra ATA IDE Hard Drive/10ms
- [illegible] • 3.5" FDD
- [illegible]
- Ensoniq™ PCI Wavetable Sound Card
- 56K X2™ Technology or K56Flex Voice Fax Modem, Speaker Phone
- 2 USB Amplified Speakers
- Microsoft® IntelliMouse®
- 104-key Win95 Enhanced Keyboard
- MS Windows 95 CD
- MS Office 97 CD, Internet start-up kit
- [illegible]
- 15" Flat Screen .28 NI Monitor

TITANA G-233XL $1849
TITANA G-200XL $1749

UNICENT TITANA

Exceptional Value for Small Offices and Homes

TITANA 200VL

$1549 *Business Lease As Low as $54/mo

- Intel® Pentium 200MHz processor
- 32MB SDRAM [illegible]
- 512KB Pipelined Burst Cache, Flash BIOS
- Tool-Free Tower or Desktop Case
- Ultra DMA/33 EIDE controller
- 2.1GB EIDE IDE Hard Drive
- [illegible] • 3.5" FDD
- [illegible]
- Ensoniq™ PCI Wavetable Sound Card
- 56K X2™ Technology or K56Flex Voice Fax Modem, Speaker Phone
- 2 USB Amplified Speakers
- Microsoft® IntelliMouse®
- 104-key Win95 Enhanced Keyboard
- MS Windows 95 CD
- Internet start-up kit
- [illegible]
- 15" Flat Screen .28 NI Monitor

TITANA 166VL $1499

TITANA 166VA

$1299 *Business Lease As Low as $50/mo

- Intel® Pentium 166MHz processor
- 16MB EDO RAM, Intel® 430TX Chipset
- 512KB Pipelined Burst Cache, Flash BIOS
- Tool-Free Tower or Desktop Case
- Ultra DMA/33 EIDE controller
- 1.2GB EIDE IDE Hard Drive
- [illegible] • 3.5" FDD
- Matrox Mystique 220 2MB SGRAM Video
- [illegible]
- 2 Universal Serial Bus
- Microsoft® IntelliMouse®
- 104-key Win95 Enhanced Keyboard
- MS Windows 95 CD
- [illegible]
- 15" Flat Screen .28 NI Monitor

TITANA 200VA $1349
TITANA 133VA $1279

MOST SYSTEMS WILL BE SHIPPED IN 48HRS

CONFIGURE YOUR UNIQUE SYSTEM ANY WAY YOU WANT WITH ANY OF THESE GREAT OPTIONS

- Iomega Zip Drive IDE int. w/ 100MB Cartridge $99
- Iomega Jaz Drive SCSI int. w/ 1GB Cartridge $299
- 3.2GB Travan Tape Backup w/ Tape $189
- APC Back-UPS PRO 280 ... $149
- APC Back-UPS PRO 650 ... $299
- For Microsoft® Natural Keyboard add $49
- For Sound System w/ Subwoofer add $99
- For Windows NT 4.0 Workstation add $99
- 3COM Fast Etherlink 10/100 Ethernet Card $89

UNIWARRANTY

- 30-Day Unconditional 100% Money-Back
- Five-Year Parts and Three-Year Labor Warranty.
- First Year of On-Site Service Included. (Three-Year contract add $99)
- 24-Hour, 7 days a week Toll-free technical support

unicent

We put the personal back into personal computers.

280 LENA DRIVE, AURORA, OHIO 44202

1 800 73 [illegible] • TOLL FREE

216-344-2649 • International Sales

800-731-6159 • Executive On Ventas Bilingue

800-731-6.82 • Technical Support

216.344.2647 • FAX

http://www.unicent.com

VISA C.O.D. UPS

All Prices and Specifications Subject to Change Without Notice • Unicent Technologies cannot be responsible for any omissions, errors in typography or photography • All Returned Items Must have RMA # and Must Be in Original Packaging • Shipping Charges, Opened Software and Custom Configured Systems are non-refundable • Absolutely no refunds for merchandise returned after 30 days. • Government, School, and Corporate Purchase Orders are always welcome. • For More Information On Warranty & Policy Please Call. • On-Site Service is a non-refundable option • All logos and brand names are trademarks of their respective companies. * Business Lease payments are based on 36 month fair market value lease and do not include shipping/handling or applicable taxes. Lease rates are subject to change without notice or stipulated.

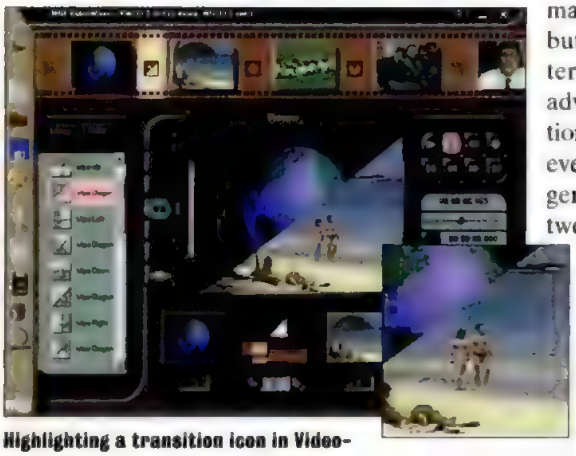
Our Convenient Business Hours are: 8am-Midnight Monday thru Friday 9am-7pm Saturdays and Sunday (Eastern Standard Time).

1-800-731-6526

[illegible]

ENSONIQ matrox Quantum CAPACITY FOR THE EXTRAORDINARY U.S. Robotics TOSHIBA

CIRCLE 055 ON READER SERVICE CARD



Highlighting a transition icon in VideoWave's storyboard allows you to create wipes. The final movie shows the jaggies wipes without anti-aliasing (inset).

an accurate but slow preview to a real-time preview that drops frames as necessary. Support of both MMX and Intel's rendering libraries let VideoWave easily display real-time previews of relatively short productions (30 seconds or less).

VideoWave's basic editing tools include a scrub bar (used to play the video manually), in/out markers, a split button, and color correction filters. The program does not offer advanced synchronization functions. In fact, VideoWave does not even display SMPTE time code, so generating acceptable syncs between the video clips and the voiceover took extra effort.

VideoWave's strength lies with its interface, not with its modest selection of filters and transitions. Transparent overlays and square video insets work just fine, but other compositing functions are less impressive. Chroma keys are limited, and freeform paths and 3-D effects are beyond VideoWave's scope. Since we reviewed the product in the First Looks section of our issue of July 1997, MGI Software has improved VideoWave's audio functions. But in general, VideoWave still offers only bare-bones audio editing.

Although it can't rival the sheer number of features found in Corel Lumiere Suite 1.0, for example, VideoWave provides almost everything home users and budding corporate developers will need, and its innovative interface makes video editing as easy as using your VCR.

MGI VideoWave. Street price: $100. Requires: 486-based PC or better, 16MB RAM, 20MB hard disk space, Microsoft Windows 95. MGI Software Corp., Richmond Hill, Ontario; 888-644-7638, 905-764-7000; fax, 905-764-7110; www.mgisoft.com. *Circle 514 on reader service card.*

NewSoft Inc.

Presto! VideoWorks

Targeted at cost-conscious home video enthusiasts who want a full-featured video editor, Presto! Multimedia Suite ($50 street) is a set of applications for managing and manipulating video and multimedia files. The suite's video editor, VideoWorks, is a simple program with some attractive features, but its performance was uneven on our tests.

A 16-bit program, VideoWorks captured 30-fps, full-screen video at a dramatically lower data rate (and therefore lower quality) than its 32-bit competitors did. VideoWorks is best suited for capturing video at quarter-screen resolution. However, video capture itself was quite fast, and the program both captured and printed to tape without a hitch.

The VideoWorks interface is very simple. Opening a file loads the clip into the playback window, and a toggle switch converts the program to filmstrip mode for editing. Each player/filmstrip window can contain only one clip, but you can open as many windows as system memory allows.

VideoWorks' Windows 95 support is minimal, but it makes the most of drag-and-drop, allowing you to cut a selected segment from one filmstrip and paste it into another. VideoWorks' variations on the Paste command (including Paste Insert and Paste Overwrite) provide access to almost all of the program's editing functions. Even novice users will have little trouble understanding the Clipboard paradigm.

Just because it's simple, however, doesn't mean VideoWorks is efficient. Editing in VideoWorks using this cut-and-paste approach can be quite tedious as well as imprecise. VideoWorks does not support synchronization markers or SMPTE time code, making desired preci-

Still Analog After All These Years

Two companies that manufacture analog-based editing tools for creating broadcast-quality video also offer low-end products for business and home users. Pinnacle Systems' VideoDirector Studio 200 (415-526-1600; *www.pinnaclesys.com*) and Videonics' Video Toolkit 3.0 (800-338-3348; *www.videonics.com*) utilize hardware controllers and editing software to connect a PC to analog video devices.

These inexpensive devices (less than $300 street) attach to standard external computer ports. Neither demands a powerful PC; a 386 with a free serial port will do just fine. And they require a minimal amount of hard disk storage, because they store only time-code references and thumbnails on the PC. In short, both products deliver full-screen, full-resolution VHS or S-VHS video at a very low cost.

VideoDirector supports a maximum of two devices and provides a basic yet complete consumer video-editing solution. By contrast, Video Toolkit does not deliver special-effects functions on its own but can be connected to hardware-effects generators.

VCR-like controls let you play, rewind, and fast-forward videos on your PC to review and log on to the contents of each tape. If your PC is equipped with a graphics overlay card, you can view full-motion video on your PC's monitor. Like all editing programs, VideoDirector and Video Toolkit let you trim and sequence clips. The final movie is duped directly from one analog-video device to another.—*LS*

PHOTOGRAPH BY THOM O'CONNOR

ARE YOU READY TO RUN YOUR BUSINESS WITH THE INTERNET?

Very shortly, new Internet technologies will provide the speed and security to make complex business transactions the norm. This evolution to a "transactional Internet" will dramatically transform the way business is conducted. The competitive leaders in tomorrow's marketplace will be those companies who can leverage the new information management paradigm to strip time and cost from the delivery of goods and services and use the global reach of a new communications infrastructure for flexible immediate access to new partners, channels, customers and markets.

Most industry pundits agree that Internet deployments for the remainder of 1997 and the beginning of 1998 will focus on new collaborative and interactive applications. However, cautions a growing legion of these same experts, IT should be preparing for Internet deployment of enterprise applications — mainly transactional applications — to begin in force by mid-1998.

How can companies ensure that they realize the full benefits of their Internet investment? By leveraging all Internet deployments — collectively known as the I-Net — into an information management infrastructure supporting the organization's core business objectives. The resulting "I-Net advantage" could be a major factor in determining future marketplace success.

UNISYS

WHY AN I-NET-BASED INFRASTRUCTURE?

Taken together, Internet technologies solve most of the problems associated with client/server computing. In addition to supporting the client/server three-tiered model, I-Net technologies and the I-Net paradigm supply a wide set of standards for providing robust content. Most importantly, they provide a cost-effective method of integrating heterogeneous computing environments, including legacy mainframes.

Not surprisingly, the I-Net is increasingly being viewed by larger enterprises as a more cost-effective choice for redeveloping and redeploying enterprise applications — core business applications for financial and operational management of the enterprise — than other client/server alternatives.

Although business-critical transactional applications are beginning to be deployed over a network of web servers, they will not reach full acceptance or critical mass until they can match the scalability, reliability and security found in today's traditional data center environments. For that to happen, a transactional I-Net infrastructure must be in place.

THE NEED FOR A TRANSACTIONAL I-NET INFRASTRUCTURE

With an explosion in the demand for I-Net-based applications being driven by business operations management, IT organizations in most enterprises face the challenge of creating a transactional I-Net infrastructure to lower both the cost and time of I-Net implementations.

What is a transactional I-Net infrastructure? It's a loosely-coupled, robust and scalable networked architecture. And, because it's standards-based, you can interoperate with virtually any computer, at any customer, vendor, or partner location.

In the I-Net transactional infrastructure, no computer works alone. Using standard networking solutions based upon TCP/IP, an I-Net transactional infrastructure begins with a network of servers working together.

Because security is often a concern, transactional I-Net applications can be built with relatively high levels of security, including the use of dedicated (safe) networks and firewalls, as well as a variety of security applications such as credit authorization, or secure payment.

As always, scalability of your applications is essential. It will be difficult to predict the network demands of your new applications as growing numbers of them consume disk, memory and network capacity, and the corporate business focus becomes more web-oriented.

To meet your corporation's obligation to respond to customers and key internal users, it's essential that you plan for your applications to be deployed on systems with the processing power needed to handle the workload in an expeditious manner. For example, with an I-Net transactional architecture, you'll want to consider NT Servers that offer true scalability beyond four CPUs.

System outages and loss of data integrity in any business-critical application can cause catastrophic results. Reliability, transactional integrity and high availability become primary concerns in the loosely-coupled I-Net transactional infrastructure. High-availability (7x24) coverage requires fault-tolerant systems, with hot-swappable components, mirrored servers and disks, and clustering with failover capabilities.

Interoperability and integration move to the forefront, demanding attention. Industry-standard solutions provide for ease of interoperability. The mix of products will be fluid as the enterprise seeks best-of-breed solutions to stay on the leading edge of the business world. Platform-independence, provided through browser-based thin clients, becomes an essential part of business application deployment.

These incremental requirements for an I-Net transactional infrastructure will all have to be met as organizations work to standardize on a new enterprise operating system, Microsoft Windows NT. Zona Research reports that in 1996, 34% of Internet sites and 55% of intranet sites were run on Windows NT. In a recent study, when asked what company was being considered for their next server operating system, 99% answered "Microsoft." NT is quickly becoming the operating system of choice for I-Net applications, further solidifying a standards-based infrastructure.

Sound like a can of worms? Perhaps, but the payoff in the short term will be vast. Aside from lower costs and easily-deployed and more supportable applications — typically, 70% of the cost of any new application deployment lurks in the creation of the infrastructure needed to deploy it — the big payoff will be your access to new markets via a global Internet infrastructure.

More aggressive I-Net adopters are beginning to use these I-Net technologies to improve how they conduct business and interact with customers:

- **TCP/IP** – an extremely reliable networking protocol set in use for over three decades and designed to withstand nuclear war.
- **Hypertext** – a simple and standard development language that gives organizations the ability to link information without complex programming efforts.
- **Easy-to-use application development tools** – development environments like Java offer easy-to-use tools that support rapid application development.
- **The browser** – a common user "client" that masks variations of the heterogeneous underlying computer systems.

New online service opportunities will appear and value-added applications will be created. The core of business applications will be transformed as this new paradigm takes hold.

LEVERAGING THE I-NET: ARE YOU LEADING OR LAGGING?

The unparalleled growth of the Internet and broad acceptance of its standards and technologies allows organizations like yours to re-assess relationships with customers, suppliers and employees. For many organizations, the benefits for internal communication, collaboration and information management offered by I-Net technologies have prompted them to turn inward, using the technologies of the Internet — browsers, information management and access standards, and powerful development environments like Java — to transform a corporate network into a corporate intranet.

Still others are busy deploying extranets — virtual networks linking suppliers and customers. Powerful enough to create a virtual global supply chain, extranets strip out cost and time by providing almost instantaneous information transfer and communication between suppliers, trading partners and clients. The savings you can achieve with an extranet can enable you to increase the overall value of goods and services to your customers.

However, while most major companies have a basic website, it's usually a passive repository of corporate and marketing information. Only a few have leveraged I-Net technologies to transform business processes through the collaborative communications and rich information management environment of the 'Net.

"AQUANTA SERVERS FROM UNISYS"

Aquanta XR/6 Server.

The Aquanta server line from Unisys was designed to leverage the power of Windows NT. With up to ten Intel Pentium Pro processors, the Aquanta is the leader in scalability for NT on Intel. Enterprise-level availability, combined with very-high-performance from a Scalable Coherent Memory architecture that supports eight gigabytes of RAM, provides enterprise-class throughput. Scalability and performance are enhanced by the unique addition of four megabytes of Level 3 cache for each dual processor board, thus providing dramatic improvements to system bus throughput as well as overall system performance.

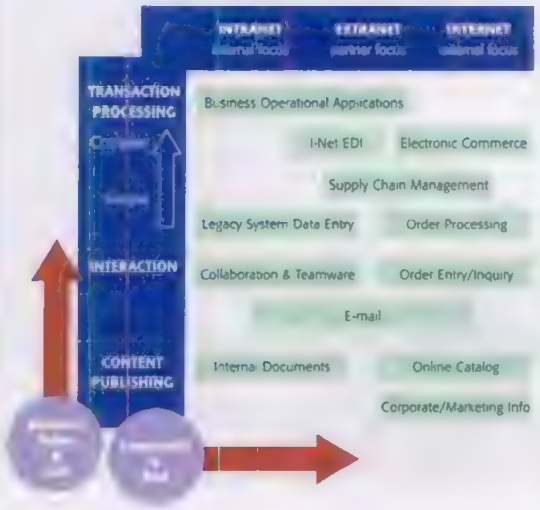
The Aquanta server, whether six- or ten-way, is an ideal platform for NT. With built-in hardware RAID, high-speed PCI I-O bus and a very-high-speed internal bus between processors, the Aquanta is the platform designed to exploit innate NT capabilities.

The Aquanta line – including NetPCs and other client-side computers to complement the servers – provides a complete range of Intel-based PC machines for the enterprise environment.

Unisys' worldwide presence insures availability of support personnel both onsite and at help desks. Aquanta computers are built to order, preloaded and pretested for enterprise-class businesses through a direct sales force that concentrates on helping channel partners. When high-performance servers are needed, Aquanta leads the way.

Visit our website at www.unisys.com to find out more.

I-Net Applications



SEIZING THE OPPORTUNITY

Even though the full potential has not really even been tapped, early adopters are posting very impressive returns and organizations now have the ability to transform essential business processes quickly and cost-effectively. Today, for example, companies are using the web to simplify and lower costs for transaction-based activities, such as allowing customers web access to place orders or inquire about order status, which reduces the need for call center personnel. A recent IDC study reveals that for some companies, I-Net applications have resulted in a dramatic return on investment, from 500% to 2,500%. Recently published statistics from Meta Group research on installed intranet applications reported first year returns on investment of between 44% and 76%. The payback period for these applications varied from less than two months to just over a year. With potential results like

these, the fundamental question becomes "How can your business take advantage of I-Net technologies?"

TAKING ADVANTAGE OF I-NET TECHNOLOGIES

The best place to start is to pilot test applications where the most benefit to the organization can occur and where the internal processes are best understood. As the complexity, enterprise scope and business impact of I-Net applications increase, so do the risks of a longer, more costly implementation, or, ultimately, failure. You will want to choose a partner who can help you to maximize the opportunity while minimizing the risk.

In selecting this partner, look for a vendor whose core technology competencies meet the particular needs of the pilot. A good pilot test will "touch" a wide number of systems and will require an equivalent range of skills. The experience required for such things as enterprise-class systems, high-availability systems, online transaction processing (OLTP) and the development of mission-critical enterprise information management software is far different than what it takes to create a web-based catalog.

FOCUS ON TRANSFORMING A BUSINESS PROCESS

Companies that design and manage such systems need to have a history of enterprise-class information management. Since a good transactional I-Net pilot will focus on transforming a business process, it is also important that your vendor understand the business environment in which you operate.

So select a partner who has delivered I-Net business solutions to companies with similar business, vertical and operational characteristics. And most importantly, select a vendor who understands that no single source alone has the ability to deliver a complete transactional I-Net infrastructure. Select a vendor who has expertise with a best-of-breed approach to ensure that you have access to the most powerful software tools and leading-edge I-Net application solutions as well as a worldwide infrastructure of service, integration and delivery partners (*See "How Unisys can help"*).

PARTNERSHIP HELPS YOU TO AVOID I-NET RISKS

Those who venture unprepared into this new I-Net territory face peril unless they forge the right partnerships. But remember, the first competitor in your industry who transforms its business through effective I-Net deployment will forever raise the competitive bar.

Are you ready to be that competitor?

For more information on how Unisys can help you to transform your business through effective I-Net deployment, please visit our website at www.unisys.com.

"HOW UNISYS CAN HELP"

Unisys is a worldwide corporation with a long heritage of providing enterprise-class applications, hardware, support and integration capabilities. To leverage the I-Net for competitive advantage, you need an experienced partner with powerful and scalable NT technology, integration skills to tie in legacy and client/server systems and the network support infrastructure to support potentially global deployment of web technology. Unisys is that company.

Unisys has been deploying Internet-based solutions since 1988, with the implementation of its first global customer support network. Since then, Unisys has web-enabled its human resources, procurement and accounting functions, and tied distributors, resellers and business partners into an extranet that allows them to access information, place orders and track delivery.

Unisys has leveraged its internal expertise – along with a rich heritage in delivering complex, enterprise-wide, transaction-intensive solutions – to develop and deploy I-Net solutions with its customers in financial, public sector and commercial industries.

In close cooperation with the leading I-Net technology providers (Netscape, Microsoft, Oracle and BEA), Unisys has developed a full line of Internet servers, called the Relationship Network Servers (RNS). The RNS family provides a common front-end to heterogeneous back-end processes and integrates transaction processing capabilities into the leading Internet development environments. RNS servers provide a fundamental building block for the transactional I-Net architecture.

The Unisys Global Customer Services (GCS) business is one of the fastest-growing top-tier network integrators, specializing in network design and implementation and distributed computing support services. Unisys GCS can deliver everything you need to build an enterprise networking infrastructure to support your I-Net application deployment.

Unisys is also committed to bringing Microsoft Windows NT to the enterprise level to achieve an open, seamless desktop-to-corporate-headquarters computing environment. In close coordination with customers and strategic partners, Unisys is working on initiatives with Microsoft in the areas of the NetPC and total cost of ownership (TCO). The Unisys Information Systems Group, with its Enterprise NT Services organization, was the first information services firm to offer the full suite of services required to develop and deploy mission-critical applications with enterprise attributes on the Windows NT operating system.

With Unisys' history of enterprise-level information management, the Internet is but an extension of the enterprise onto a worldwide client/server system. When dealing with information on a worldwide scale, you need a partner with world-class information management skills.

SUMMARY OF FEATURES See www.pcmag.com for interactive views

Video Editing

ENTRY-LEVEL EDITORS MIDRANGE EDITORS
■ YES ▥ NO

Products listed in alphabetical order	Corel Lumiere Suite 1.0	MGI VideoWave (PC MAGAZINE EDITORS' CHOICE)	Presto! VideoWorks	Adobe Premiere 4.2 (PC MAGAZINE EDITORS' CHOICE)	Kokesion 1.0	MediaStudio Pro 5.0
Price	$70 (street)	$100 (street)	$50 (street, for Multimedia Suite)	$600 (street)	$500 (street)	$500 (street)
Additional software bundled with program	Corel Motion 3D 7, Corel PhotoPaint 6, SmartSoundWizard	Iterated codecs, Microsoft ActiveMovie, VDONet, VIVOActive, Vxtreme	Kai's Power GOO SE, Mediamatic Media Player, Presto Image Folio, Presto Media Clips, Presto Media Player, Presto PageManager	Acrobat Reader, Adobe Premiere Plug-in SDK, Adobe Streamline, ATM Lite, Clear Video Codec, Crystal Flying Fonts, Crystal 3D Vortex, PhotoShop LE, Smart Sound, VDO Live Codec	Boris Effects, Pixelan Video Spice Rack, Synergy International Take 32, Ultimatte	Audio Editor, ClearVideo, CG Infinity, Netshow, PhotoImpact (trial version), Progressive Networks, VDO, Video Capture, Video Paint, VIVO, Vxtreme
Maximum zoom in/zoom out	1 frame / 20 seconds	N/A	Depends on hardware	1 frame / 2 minutes	1 frame / 10 seconds	1 frame / 1 minute
Saves uncompiled project files	■	■	■	■	■	■
Media library/Search functions	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Maximum number of tracks	99 video, 99 audio	4	1 per movie*	99	Unlimited	101
Displays SMPTE/VITC code	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Device control for step capture protocols	None	MCI	None	ARTI, ViSCA, V-Lan	None	ViSCA, V-Lan
Batch capture and recapture	■	■	■	■	■	■
Captures SMPTE timecode from analog source	■	■	■	■	■	■
Imports AVI/Quicktime MOV/MPEG	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Exports AVI/QuickTime MOV/MPEG	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Imports and exports Autodesk FLC or FLI	■	■	■	■	■	■
Imports and exports:						
TIFF/LZW TIFF/Alpha-channel TIFF	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
JPEG/GIF/PCD	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Targa/.BMP/PCX	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
.WAV/AU/AIFF	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Supports sequenced bitmaps	■	■	■	■	■	■
Codecs supported:						
Intel Indeo 3.2/Indeo Video Interactive	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Cinepak/MPEG/Quicktime	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
RAW Indeo/MS Video RLE/Video 1	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Clip-editing windows	■	■	■	■	■	■
Snap-to markers in clips/on timeline	■ ■	N/A	■ ■	■ ■	■ ■	■ ■
Ripple edit/Rolling edit/Razor cut	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Single-track/multitrack selection tools	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Virtual clips	■	■	■	■	■	■
Number of transition/filter effects	70 / 68	28 / 9	45 / 12	75 / 63	21 / 32	109 / 52
Support for third-party transitions/filters	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Number of key types	7	3	2	14	5	10
Number of audio filters	10	3	6	5	1	13
Number of movie/sound/still-image clips	206 / 35 / 41	149 / 70 / 150	68 / 123 / 298	43 / 107 / 93	0 / 0 / 300	90 / 10 / 50
User-defined 2-D/3-D (z-axis) motion paths	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
User can insert uncompiled titling project into video project	■	▥	▥	■	■	■
Output format for decision list	N/A	N/A	N/A	CMX 3400, CMX 3600, Grass Valley, Sony BE	N/A	Generic text

N/A—Not applicable. The product does not have this feature. * Presto! VideoWorks can open multiple movies simultaneously.

sion edits even more difficult.

VideoWorks' performance was inconsistent from task to task. Simple edits were truly speedy. But the program bogged down as projects got more complex, and the program occasionally displayed alerts or failed to complete a task.

VideoWorks does not save uncompiled project files or reconcile different frame sizes and rates automatically in the workspace. Instead, you must explicitly convert files to the necessary format and recompile video clips repeatedly—a perfect scenario for generational loss of quality.

Filter effects can be varied over time with simple start/stop values. The ability to apply a filter to a selected portion of a clip adds real power, functioning as pseudo-keyframing for special effects. The suite also earns high points for its close integration. For example, you can easily segue (via OLE) from VideoWorks to ImageFolio to hand-paint individual frames in a movie.

Thanks to previews of the actual source video in its dialog boxes and straightforward controls, creating a custom 3-D path or a chroma key is a snap. Quality suffers, however, from the lack of subpixel positioning and anti-aliasing.

Our testing with audio leads us to conclude that VideoWorks cannot adequately handle stereo .WAV files. Using such files yielded more static than sound. And VideoWorks does not allow you to specify an audio codec at output time.

Presto is working on a 32-bit version of

© Copyright 1997 Novell, Inc. All rights reserved. Novell is a registered trademark and
Net and NDS are trademarks of Novell, Inc. in the United States and other countries.
Windows is a registered trademark of Microsoft Corp.

IT'S NOT A PUZZLE.

(It's a network.)

No matter how you put it together, we live in a networked world.

And no one knows networks like Novell.

We pioneered PC networking.

And, with our open standards approach, we're building on that expertise to enable future networking revolutions.

We're extending the power of existing networks and the return on existing investments.

And we're creating unique solutions such as Novell BorderManager and NDS™ for NT—the industry's only directory services solution that enhances the flexibility and manageability of Windows® NT environments with an open architecture and single-point administration for lower cost of ownership.

Networks are getting bigger, faster and more complex, embracing more users and more resources on more platforms in more places.

And the Internet is effectively the ultimate network, the network of networks.

But that's the point: They're all networks.

And Novell has the tools and technologies to put all the pieces of the networking puzzle together for you.

www.novell.com

Novell®

When you paste a clip into another filmstrip, VideoWorks lets you apply transitions. Its rendering engine uses a dithered pattern that caused pixelation.

VideoWorks that promises to address many of the program's shortcomings. For the moment, VideoWorks' below-par rendering quality will leave professional and corporate users disappointed. But for home users seeking a budget solution, Presto! Multimedia Suite is worth a look. **Presto! VideoWorks.** Street price: $50. Requires: 386-based PC or better, 8MB RAM, 20MB hard disk space, Microsoft Windows 3.1 or later. NewSoft Inc., Fremont, CA; 800-214-7059, 510-445-8600; fax, 510-445-8601; www.tophat.com. *Circle 515 on reader service card.*

MIDRANGE

Adobe Systems Inc.

Adobe Premiere

PC MAGAZINE EDITORS' CHOICE

The veteran entry in this market, Adobe Premiere 4.2 takes the high road of desktop video editing in terms of both features and price. At $600 (street), Premiere is the one of the pricier products we saw, but it is also the most stable. And though it's been around a long time, Premiere 4.2 has held up well thanks partly to its extensible architecture. It remains the power user's video editor of choice.

Premiere is a traditional editor in which separate windows provide access to a multitrack SMPTE timeline, previews, transitions, trimming functions, and the clip library. Putting our test video together was a pleasure. Tools like ripple and rolling edits, multiple-track selection, and the jog, shuttle, and play commands in the clip window make it possible to edit large amounts of footage quickly. The specialized trim window lets you edit the tail and head of adjoining clips simultaneously. Guidelines and the ability to snap to the edge of a clip or marker help keep elements in sync.

As for special effects, even when Premiere doesn't offer a specific function, such as true 3-D motion controls, there's a workaround. In this case, the Camera View filter allows you to rotate clips fully, albeit without the benefit of the subpixel positioning employed by the motion-path function. The 14 different key types are just the beginning of Premiere's robust compositing functions. And uncompiled titling sequences, complete with gradients, automatic drop shadows, and geometric shapes, can be incorporated into the timeline.

Adobe Systems and third-party plug-ins help keep Premiere on the cutting edge. For example, Premiere has a plug-in that boosts performance on MMX systems; our tests showed a modest performance gain of 5 to 10 percent. Premiere is the first program in this roundup to generate an animated GIF file, thanks to a new plug-in available on Adobe's Web site. And professional producers who rely on device control to log SMPTE codes or to capture in batch mode can choose from a broad range of plug-ins.

We found that Premiere's Print to Video function—which can't access the specialized caching software offered by today's crop of video capture/output boards—jitters during playback. But once again, a plug-in (in this case, miro Computer Products' export plug-in Instant Video) saved the day—by playing high-resolution, high-data-rate, NTSC dropped-frame video right from the timeline, for impressive previews and output back to tape. Even without ActiveMovie or Direct 3D support, Premiere turned in truly speedy performance when importing files and redrawing bitmaps on the timeline.

Cut-and-Paste Editing

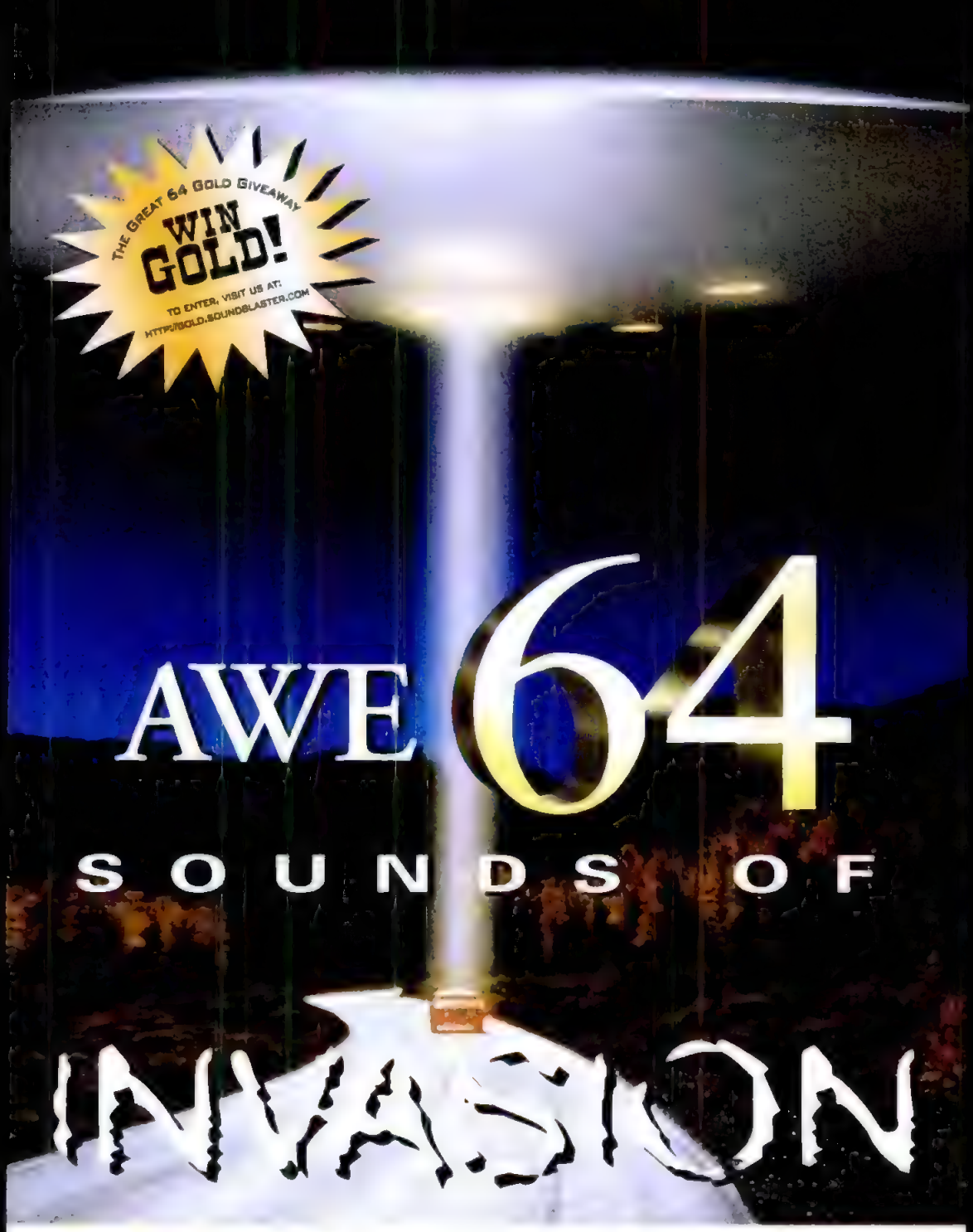
The key to MPEG-1 is its sophisticated compression scheme, which can squeeze video by a factor of 100:1. At that ratio, MPEG-1 becomes extremely difficult to edit, and most AVI-based editing programs don't even attempt it. Dedicated MPEG editors, by contrast, allow you to perform basic edits in the MPEG stream.

ClipView ($99 list), from FutureTel, (800-658-5868, *www.futuretel.com*) and iFilmEdit ($49.95 list), from Cinax Designs (604-685-2364, *www.cinax.com*), are aimed at the consumer market. These products limit their feature sets to the not-so-simple cutting and pasting of IPB-encoded MPEG files. They don't offer transitions, filter effects, motion paths, or overlays. And output is restricted to MPEG video and VideoCD.

ClipView's unconventional interface is designed to make video editing intuitive. Video blocks are represented by 3-D rectangles, whose edges have been rendered to match the image data on each frame. To sequence clips, you drag them from the Clip Explorer or workspace and drop them on the playback track, where they snap end-to-end. ClipView's edits, unlike those of iFilmEdit, are frame-accurate. And ClipView saves project files and can open several projects simultaneously.

iFilmEdit uses conventional VCR buttons to control the Play and Record windows. You can set in/out markers in the Player window. The Library, where clips for the current work session are collected, displays easy-to-identify thumbnails. But iFilmEdit does not save uncompiled projects; it links together multiple clips like a linear editor as you add them to the Record window.

Today's low-cost encoder cards and software-only decoders are making MPEG video a viable alternative. ClipView and iFilmEdit are valuable tools for editing MPEG videos without sacrificing their high quality.—*LS*



1. "We Come In Peace."
2. Blasting Ray Guns.
3. People Screaming.
4. "You Must Believe Me!"
5. Exploding Buildings.
6. Whirring Space Ships.
7. Brains Being Sucked.
8. Bones Crunching.
9. Aliens Phoning Home.
10. Metallic Scraping.
11. Cars Crashing.
12. Kidneys Bursting.
13. Insertion of Probes.
14. Heads Exploding.
15. "Run for Cover!"
16. "Warning."
17. Aliens Melting.
18. Pods Hatching.
19. Destroying the Monster.
20. Buildings Imploding.
21. Spaceships Docking.
22. Boiling Flesh.
23. "Mayday, Mayday!"
24. Exploding Spaceship.
25. People Running.
26. "I saw a UFO!"
27. Planes Taking Off.
28. "We're at DefCon 1."
29. Aliens Communicating.
30. Children Crying.
31. Slurp.
32. Clink of Autopsy Instruments.
33. Laser Swords Crashing.
34. "Hyperspace!"
35. Flesh Being Torn Off Bones.
36. "They're Coming."
37. Wailing Sirens.
38. "You Must Die."
39. "Beam Me Up."
40. Zap!!!
41. Air Locks Closing.
42. "Oh, My God!"
43. Lasers Charging Up.
44. "We Need More Power!"
45. Ray Guns Blasting.
46. Calling the Mothership.
47. Horns Blaring.
48. "We Won!"
49. "Lock on Target!"
50. Crystals Charging.
51. Area 51 Guard: "No Admittance."
52. Zap-Zap!
53. Warning Alarms.
54. Air Locks Opening.
55. "Set to Stun!"
56. "Red Alert!"
57. Shields Up.
58. Warp Speed.
59. "Blast 'em!"
60. Eyeballs Squishing.
61. Spaceships Cloaking.
62. Radar Ping.
63. "Fire at Will."
64. "Take Me to Your Leader."

The **Sound Blaster® AWE64 Gold™** is ready to invade your multimedia PC. The Sound Blaster AWE64 Gold is simply the best sounding Sound Blaster ever. And it's designed specifically to upgrade your PC's multimedia audio system. Play back up to 64 simultaneous voices, and produce a richer, fuller sound that's out of this world. With 20-bit digital output, audio quality is uncompromised. And ,of course, compatibility is assured because it's a genuine Sound Blaster. To listen to and learn more about the Sound Blaster AWE64 Gold contact us at:

www.SoundBlaster.com/sound/AWE64Gold.

©Copyright 1997 Creative Technology Ltd. Sound Blaster and the Creative logo are registered trademarks and AWE64 Gold, Creative WaveSynth WG and Emu 3D Positional Audio are trademarks of Creative Technology Ltd. All other names are property of their respective owners. All specifications are subject to change without prior notice. All rights reserved.

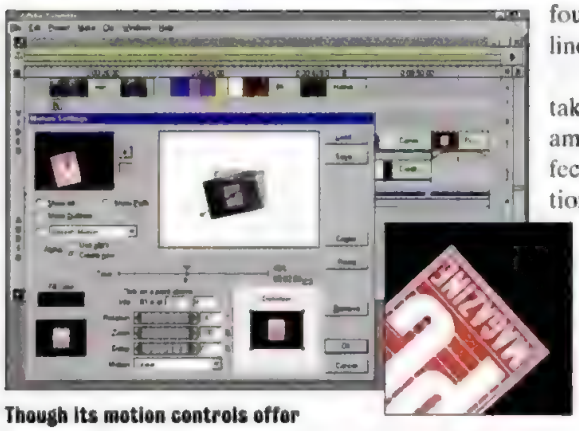
CREATIVE

WWW.SOUNDBLASTER.COM

CIRCLE 095 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

On our tests, Premiere generated high-quality output for CD, tape, and Internet/intranet distribution. Its advanced output options, which include optimization of still images and the ability to avoid unnecessary recompression, give producers total control over the final rendering.

At several points in our testing, though, Premiere showed its age. For example, Premiere captured video at a significantly lower data rate (6 MBps) than Ulead Systems' MediaStudio Pro 5.0. A small but annoying bug also prevents it from playing audio compressed with the ADPCM or VDO codec in the clip window (though the audio plays fine in Microsoft Media Player or Premiere's Preview software).



Though its motion controls offer powerful features, Premiere is limited to simple 2-D rotation. But subpixel positioning helps preserve details.

Despite these annoyances, Adobe Premiere remains the top desktop video editor. Its efficient editing tools, consistent output, and extensible architecture continue to set the pace in this category.

Adobe Premiere 4.2. Street price: $600. Requires: 386-based PC or better, 10MB RAM (16MB for Windows NT), 100MB hard disk space, Microsoft Windows 95 or NT 3.51 or later. Adobe Systems Inc., San Jose, CA; 800-866-8006, 408-536-6000; fax, 408-537-6000; www.adobe.com. *Circle 516 on reader service card.*

in:sync Corp.

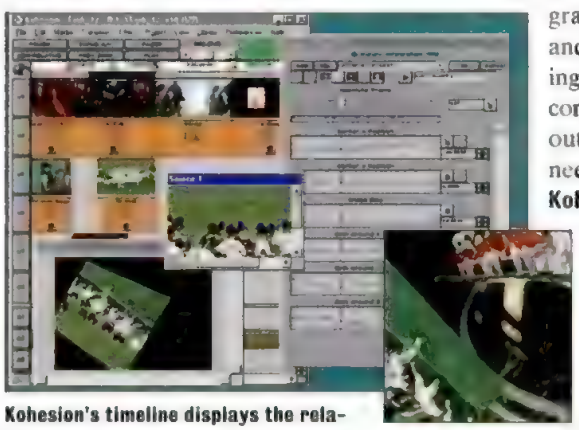
Kohesion

A new addition, Kohesion 1.0 shares technology with in:sync Corp.'s flagship product, Speed Razor Mach 3.5, but differs in key respects. While Speed Razor ($1,500 street) is integrated with high-end video capture hardware and runs under Windows NT only, Kohesion ($500 street) works with any Video for Windows–compliant capture board and runs under Windows 95. Speed Razor is optimized for broadcast video; Kohesion is streamlined for video delivered via CD-ROM and the Internet.

Like its big brother, Kohesion provides powerful library functions and a multipurpose Item Info window, and it supports an unlimited number of tracks on the timeline. In addition to standard in/out markers, Kohesion's Item Info window provides unique editing functions. For example, you can lock the head of a clip and then enter a specific duration to trim the tail automatically and precisely. We found editing directly on the timeline to be efficient.

Kohesion's unique interface takes some getting used to. For example, you must import all the effects for a project, including transitions, filters, titling, motion, and keyed overlays, into the program's library. These functions are treated just like a video asset, meaning that you can drag them to a track in the timeline and stack them in almost any conceivable combination.

Though limited in number, Kohesion's filters are very powerful, providing keyframe control and useful customization options. Kohesion also supports the Razor and Adobe plug-in specs. Because it uses Speed Razor's rendering technology, Kohesion employs subpixel positioning for motion effects and antialiasing for transitions, titling, and overlays.



Kohesion's timeline displays the relationship between filters and video clips. Resulting motion effects take advantage of soft edges and subpixel positioning to create a high-quality composite (inset).

During testing, Kohesion exhibited erratic behavior. The program captured video at a respectable 6.3 MBps, but an incompatibility with the miroVideo DC30 *plus* board prevented us from capturing audio simultaneously. Kohesion could not composite our bluescreen footage because of a conflict with our graphics board, and we experienced several crashes that corrupted the current project file.

Although Kohesion performed well on certain tests (such as displaying video on the timeline), it took longer to preview our test video or compress video for CD output because of a conflict with the Indeo Video Interactive codec. Switching to a different codec allowed the program to shine, however.

Kohesion can play straight-cut clips directly from the construction window in real time. This powerful software feature, which anticipates the hot new playback technologies offered by Matrox and miro, allowed us to trim the head and tail of our high-resolution test file and then record back to videotape without recompiling the footage.

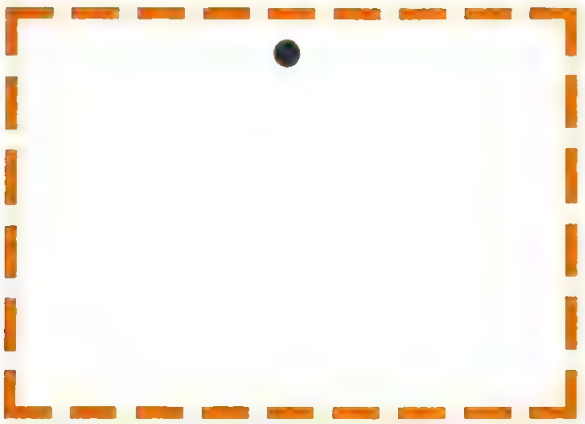
Kohesion accessed the VDO Live codec without a hitch and even allowed us to specify the correct audio sampling rate of 8 kHz. We were most impressed, however, by Kohesion's tight integration with Progressive Networks' RealVideo. Kohesion treats the RealVideo encoder as a codec—allowing you to skip the .AVI–to–Real Media (RM) conversion process. In addition, you can add hot spots to clips.

Before buying Kohesion, we recommend you try the free 30-day trial version on in:sync's Web site to make sure the program gets along with your video and graphics hardware. A promising product, Kohesion offers some compelling features, especially for output for the Internet, but it needs time to mature.

Kohesion 1.0. Street price: $500. Requires: Pentium/90-based PC or better, 16MB RAM, 800MB hard disk space, Microsoft Windows 95 or NT. in:sync Corp., Bethesda, MD; 800-864-7272, 301-656-1700; fax, 301-320-0335; www.in-sync.com, www.kohesion.com. *Circle 517 on reader service card.*

CIRQUE

Put your finger here.



Now glide it left, then right.

You've just reviewed a night's worth of websites.

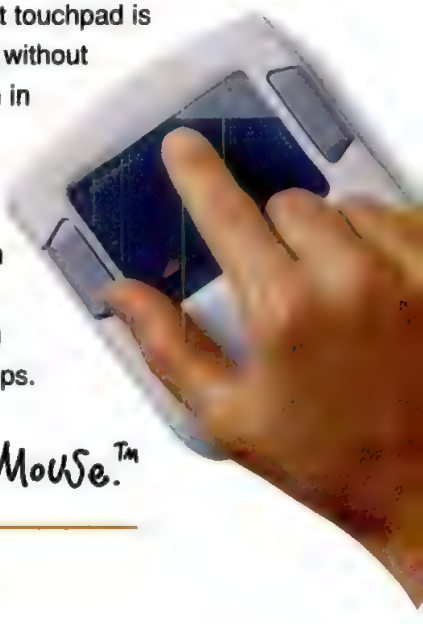
(Try doing that with your Mouse.)

New Cirque Power Cat™ Touchpad. Feel the power at your fingertip.

- Single, double and right taps
- Drag, draw or highlight beyond the pad's edge
- Tactile feedback
- 2 buttons
- Maintenance-free

All the benefits of an Easy Cat™ plus:
- Easy vertical and horizontal scroll
- One-touch zoom
- Audible feedback
- Programmable buttons and settings

Just touch. And go. Using the new Cirque Power Cat touchpad is that easy. Do everything a mouse can do and more, without moving your hand. Scroll through a document, zoom in and out and surf the Web. The Cirque Power Cat also comes with a stylus (nifty pen-like device) that lets you sign on-screen memos. The Power Cat is faster, easier, smarter and more powerful than any measly mouse could ever be. Its patented GlidePoint Control lets you use your natural pointing motion to put the power of computing at your fingertips.



Cirque Cat. Mightier than the Mouse.™

GLIDEPOINT CONTROL®

©1997 Cirque Corporation.

www.cirque.com

CIRCLE 311 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

COMPAQ

For that multimedia application called life.

We design computers for people, so we have to consider the entire range of human expression. The Compaq Presario 1200 and 1600 series were made for those whose pitch vibrates a little higher. Fully integrated, each is flush with features like DiscPlay, a CD system that plays up to 8 hours without booting up. (Because there's more to life than work.) And our PremierSound Audio System, which actually lives up to its name. Plus great video. Because let's face it, life looks pretty awesome, too. For more, tune in at www.compaq.com/athome/presario

The new Compaq Presario 1200 and 1600 Series.

intel inside

pentium PROCESSOR

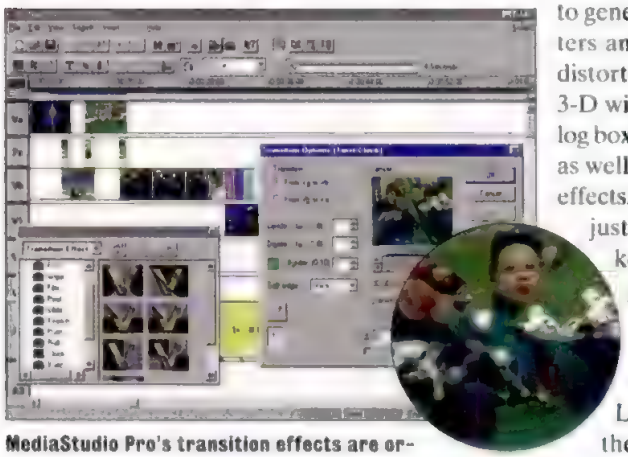
© 1997 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. Presario is a trademark of Compaq Computer Corporation. The Intel Inside Logo and Pentium are registered trademarks and the Pentium Processor Logo is a trademark of Intel Corporation.

Ulead Systems Inc.

MediaStudio Pro

For $500 (street), Ulead Systems' MediaStudio Pro 5.0 offers a powerful video editor, standalone capture utility, audio editor, character generator, and rotoscoping program. The video editor provides a standard SMPTE timeline, multiple tracks, and windows for trimming clips and previewing video. If you are new to video editing, you'll love Ulead's Video Wizard, a utility that helps you record, sequence, and trim up to nine clips.

MediaStudio Pro offers the expected collection of both basic and advanced editing functions, including a scratch pad where you can set in/out markers, a specialized trim window, ripple and rolling edits, cue markers, and snap functions. All the features are there. But we have some concerns about how they're implemented. For example, ripple and rolling edits are not tools but global editing modes, making it too easy to overwrite or misalign clips inadvertently .



MediaStudio Pro's transition effects are organized by category, such as the clock wipes (inset). Rendering controls help produce high-quality, anti-aliased output.

MediaStudio Pro captured full-screen NTSC dropped-frame video at the miroVideo DC30 *plus* board's maximum data rate of 7.1 MBps. But the high data rate is only part of the story. MediaStudio Pro can improve the image quality of a capture by analyzing and calibrating the source video via a unique software simulation of a vectorscope and a waveform monitor. We successfully recorded our captured file back to videotape by accessing miro's .AVI cache from within MediaStudio Pro.

Output for CD distribution looked and sounded good, even though the data rate was well below the specified 300 Kbps. And the program can export (but not edit) well-structured and efficient MPEG files.

When we first compiled high-resolution footage back to disk, MediaStudio Pro's Smart Render option, which avoids recompression, was not available. This program quirk caused unnecessary recompression and data loss.

On our tests, with both bitmaps and waveforms displayed, MediaStudio Pro performed almost as slowly as Corel Lumiere Suite. We noticed dramatic performance improvements, however, when we turned off the display of waveforms. Support for MMX, ActiveMovie, and Direct3D gives MediaStudio Pro the muscle to generate truly sophisticated filters and transitions, such as lens distortions, lighting effects, and 3-D wipes. The Motion Path dialog box provides true 3-D rotation, as well as perspective and scaling effects. Best of all, you can control just about every effect with keyframes. Quality output is guaranteed by the use of subpixel positioning and anti-aliasing.

The unique Production Library, which far exceeds the functions of a common catalog, allows you to sequence clips storyboard-style and then drag them en masse to the timeline. You can also save customized filters, transitions, and motion paths to the Production Library.

MediaStudio Pro is a mixed bag. Professionals will likely be disappointed by its uneven performance, inefficient trimming tools, and unnecessary recompression. But high-quality output for CD-ROM playback, free rotoscoping and vector animation, and a dazzling collection of special effects make MediaStudio Pro an attractive midlevel product.

MediaStudio Pro 5.0. Street price: $500. Requires: Pentium/100-based PC or better, 16MB RAM, 40MB hard disk space, Microsoft Windows 95 or NT 4.0. Ulead Systems Inc., Torrance, CA; 800-858-5323, 310-523-9393; fax, 310-523-9399; www.ulead.com. *Circle 518 on reader service card.* PC

visioneer

Monday:
Find that expense report from 1993 (the one with the little white lie in it).

Wednesday:
Search through records to find receipts justifying expenses. Stand in line to use the fax machine. Curse the AP department.

Tuesday:
Sort through 1996 paperwork. File some documents. Photocopy others. Recycle the originals. Repeat process until desk is recognizable.

Friday:
Organize marketing research, memos, and sales projections by client, product, and quarter.

Thursday:
Spend six precious hours retyping budget proposals that will probably get rejected, anyway.

Weekend:
Find, retype, and e-mail that newspaper article about the competition to the sales team—in France

Monday, again:
Fax this batch to the boss, his boss, her V.P., and the entire corporate marketing department

A new day is unfolding.

Introducing PaperPort Deluxe Software

It used to be hard to tell where you left off and your messy desk began. Not anymore. Thanks to a new invention called PaperPort Deluxe™ Software, your scanner can now help you tackle the paper that pervades your life. Use ScanDirect™ to scan stuff—even color stuff—directly into your favorite applications. Use FormTyper™ to scan in and fill out forms. File paper into folders up to 5 levels deep. Then find things using SimpleSearch™. Xerox TextBridge™ OCR software is included for easy editing. And PaperPort Deluxe works with Windows 95 and Windows NT, to boot.

For flatbed scanners, sheetfed scanners, multi-function peripherals, and digital cameras—or most TWAIN-compliant devices.

FOR FAST RELIEF:

Call 1-800-787-7007, extension 409 or contact an authorized reseller.
Visit our web site at http://go.paperport.com

Copyright © 1997 Visioneer, Inc. All rights reserved. The Visioneer logo and PaperPort are registered trademarks of Visioneer, Inc. Visioneer PaperPort Deluxe, FormTyper, ScanDirect, and SimpleSearch are trademarks of Visioneer, Inc. All trademarks are the property of their respective owners. VIS6091/PCM 8/97

THE COMPLETE VIDEO DESKTOP

Video Capture

Whether you are producing video for tape, CD-ROM, or the Internet, one of these products will meet your needs.

By Jan Ozer

Analog video and PCs live in two different worlds. To bring these two worlds together, you need a hardware device that can capture the video and convert it to a format that can be edited on your PC. Video capture boards vary greatly in terms of capabilities and price, so it's important to decide first what you plan to do with video before settling on a solution.

Digital video capture boards are designed to perform two basic tasks: (1) capturing for editing and printing back to tape in analog format and (2) capturing for compression and distributing digitally via CD-ROM or on the Internet. To print back to tape, a board needs an analog-out port (and adequate throughput). In contrast, any board that can digitize a real-time analog signal can capture for compression.

Our video capture feature includes nine boards in a range of configurations. All of them cost less than $1,000 on the street. ATI Technologies has two product entries, the All-in-Wonder graphics board and the PC2TV add-in board, which connects to certain ATI graphics boards. Similarly, Matrox Graphics offers Rainbow Runner Studio, a daughterboard to its Mystique 220 graphics board.

Other product entries, all traditional standalone capture boards, include Azeena Technologies' AzeenaVision 500, the Intel Smart Video Recorder III, FAST Electronics' AV Master, two entries from miro Computer Products—the miroVideo DC20 *plus* and the miroVideo DC30 *plus*—and Digital Video Arts' WakeBoard. Only three boards—the AzeenaVision, the AV Master, and the DC30 *plus*—have on-board audio capture.

IN THIS REVIEW

ATI Technologies All-in-Wonder and PC2TV 188
AzeenaVision 500 190
Digital Video Arts WakeBoard 190
FAST Electronics AV Master 192
Intel Smart Video Recorder III 196
Matrox Rainbow Runner Studio 198
miroVideo DC20 *plus* and miroVideo DC30 *plus* 198

www.pcmag.com

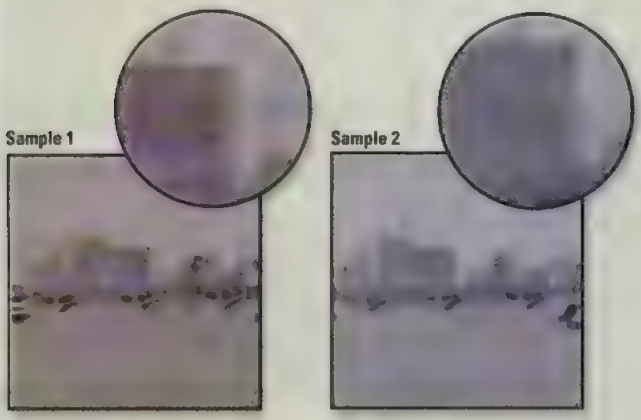
Go online for reviews of other video products and for an interactive index of our performance test results.

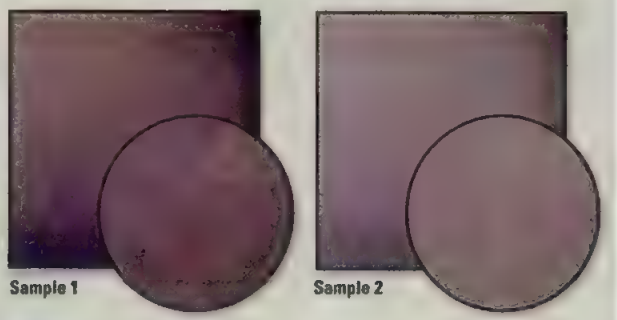
ILLUSTRATION BY ANDREW SHACHAT

Judging Video Quality

As we discovered on our jury tests, evaluating the quality of video without a trained eye can be difficult. When video samples are viewed side by side, variations in hue or brightness can often be mistaken for quality-related problems. Here are some phenomena to watch out for when evaluating video.

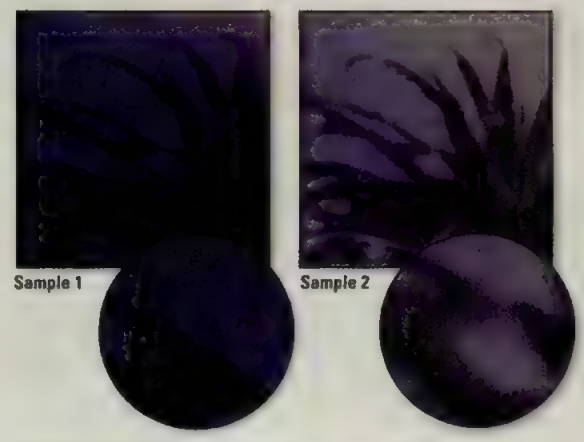
FIDELITY Color fidelity is a key differentiating factor between high and low quality. Here we see a skyline on a gray day. The image on the right faithfully reproduces the overcast sky; the image on the left introduces spurious colors that degrade image quality.





NOISE Background noise is caused by small artifacts in an otherwise smooth area. Both encoders compressed a gray background wall. On the right, the wall is relatively smooth; on the left, it has many small shapes, some blockiness, and some color artifacts. Blockiness is a clear indication of lack of compression efficiency, which forces the MPEG-1 encoder to work with blocks rather than individual pixels At 30 fps, these flaws add up to more distracting noise behind the talking head.

SQUARE/RECTANGULAR PIXELS On the left is a square-pixel, 320-by-240 image; on the right is a rectangular-pixel, 352-by-240 SIF MPEG-1 image (about 10 percent larger). On an NTSC playback device designed for rectangular-pixel images, the image on the right would look normal and the image on the left would appear abnormally narrow.



MOSQUITOES On the left, nestled between the leaves, are small artifacts that seem to hover and swarm when the video plays in real time—an effect often called mosquitoes. The right-hand image is clear.

All the boards except the Intel Smart Video Recorder III offer analog-out ports. But the two ATI products don't have on-board, hardware-based encoders, and they don't support the throughput necessary for printing back to tape. For these reasons, we tested these boards only as capture-for-compression devices.

In selecting a board for writing back to tape, the most important feature is *output quality*, which we evaluated by preparing a benchmark test tape for each board and comparing the results from jury tests. Although we report throughput numbers in megabytes per second (MBps), we found the actual output quality to be a better indicator of the board's performance.

For serious video developers, the next consideration is the scheme implemented to work around the 2GB limitation of AVI, the file format most often used for video editing. (Standard .AVI files cannot be larger than 1GB, although a few vendors have achieved 2GB through workarounds. Even 2GB, though, is less than 7 minutes of video.) Among the products we tested, we saw three different schemes, each with a dramatic impact on video duration and rendering time.

In capturing for compression, the focus shifts to the board's ability to capture in a raw uncompressed format at the target resolution of the ultimate clip, especially

for clips distributed via the Internet. Capturing raw—rather than downsizing from, say, 320-by-240 resolution to 176-by-144—avoids double compression, which decreases output quality.

After quality and brute throughput come software features. Both the proprietary capture interfaces and the bundled video editing software have a marked impact on the usability of these boards. At one end of the spectrum, ATI's boards do not currently include a bundled video editor. At the other, the miroVideo DC30 *plus* includes a full version of Adobe Premiere. We consider the software bundled with the products in this roundup, but for more in-depth coverage of standalone video editing software, see "Video Editing" in this issue.

Other considerations include installation and operational stability. We had trouble installing a surprising number of boards for this roundup. In this regard, the graphics/capture board options from ATI and Matrox offer a simpler solution for those just getting started with video.

No longer a bleeding-edge technology, digital video has come of age. If you choose your capture card carefully, you can expect to get a flexible, powerful, and easy-to-use desktop editing solution.

Editors' Choice

- Midrange: miroVideo DC30 *plus*
- Entry-level: Matrox Rainbow Runner Studio

PC MAGAZINE EDITORS' CHOICE

In the sub-$1,000 market, the miroVideo DC30 plus *is the winner hands down. For those just getting into digital video, Matrox Graphics offers a compelling low-cost option.*

The DC30 *plus* performed especially well in capture quality. On our nonlinear jury tests, it garnered an *excellent* rating for producing high contrast with faithful color reproduction and few artifacts. The DC30 *plus* also received solid scores on our MPEG-1 and RealVideo jury tests.

This product includes on-board audio. It captures in Motion-JPEG format with resolutions ranging from full-screen to 288 by 216 pixels. On our tests, the board captured video smoothly at 6.1 MBps.

The DC30 *plus* was the only board in this category that included a full version of Adobe Premiere, Version 4.2. Finally, the DC30 *plus* offers the most sophisticated solution for producing large video files. The new miroInstant Video feature allows you to render edited video directly from Premiere's timeline, drawing from multiple video clips on the fly, rather than first rendering a single large file.

Matrox's Rainbow Runner Studio was a pleasant surprise. A video capture daughtercard ($199 street), it can be paired with a Mystique 220 graphics adapter ($370 street). In a category plagued with installation problems, this product was refreshingly easy to set up.

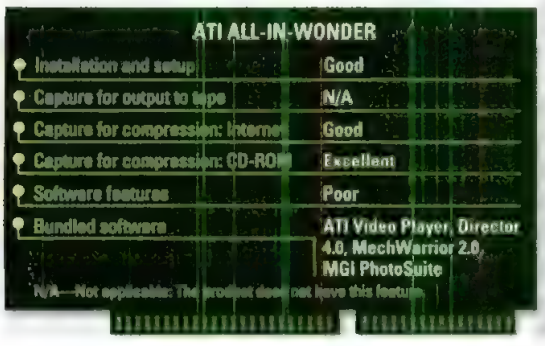
The Rainbow Runner captures in Motion-JPEG and RGB formats using a simple PC-VCR utility. It captured at 3.16 MBps and performed well on jury tests, including an *excellent* RealVideo score.

ATI All-in-Wonder, PC2TV

ATI Technologies offers two multifunction capture boards, the All-in-Wonder graphics board ($270 street) and the ATI PC2TV tuner add-in board ($100 street). Though the products produced extremely high-quality video, neither supports nonlinear editing or includes a video editor. In addition, the documentation is sparse, making the products a challenge for beginners. ATI's addition of video capture is a welcome extra, but don't buy either product for serious video production.

The All-in-Wonder, an Editors' Choice in our June 24, 1997, story focusing solely on graphics accelerators, is a 2-D/3-D graphics board with a television tuner and integrated video capture functions. Two proprietary connectors on the back bracket plug into the supplied S-Video and composite input and output cables.

In contrast, the ATI PC2TV is a separate ISA board that works in conjunction with other ATI graphics boards. We tested it with the vendor's 3D Pro Turbo PC2TV because of its ability to output NTSC video. The ATI PC2TV connects to the graphics board via a cable using the ATI Media Channel (AMC), so it's compatible only with graphics boards produced by ATI and its licensees. The board has CATV, S-Video, and composite video input connectors, along with two stereo audio inputs and one stereo audio output connector.



Although both boards have the physical connection to render captured video to tape, the lack of a compressed capture format makes them impractical for this task. Thus, you shouldn't purchase either board if your primary goal is to distribute your edited video in analog format.

ATI expects to announce a bundling agreement for video editing software in the near future, but neither of these products shipped with a video editor or a compression interface. We used Ulead Systems' MediaStudio Pro 2.5 for all editing and compression tests.

The vendor's capture application, the ATI Video Player, is a simple program bundled with both boards that uses VCR-like controls to capture and play back video clips and to capture still images. The All-in-Wonder captures in three formats—ATI Packed YUV, YVU9 Planar (Indeo Raw), and YUV12 Planar (MPEG Raw). Neither the manual nor the Adobe Acrobat help file describes these formats or how to use them.

You can capture in a number of resolutions ranging from 80 by 60 to 640 by 480 pixels, and including 176 by 144 pix-

els, which is important for streaming video. You can adjust the color, tint, brightness, and contrast of incoming video, but the slider bars have no precise digital values. This makes it difficult to reproduce the settings when capturing video over several sessions.

Both boards captured extremely high-bandwidth files, which translated into *excellent* ratings in MPEG-1 quality. In YUV12 format, the All-in-Wonder captured at a file bandwidth of 4.44 MBps; the ATI PC2TV reached 4.31 MBps. Even after compressing to MPEG-1 data rates, detail remained crisp, backgrounds were clear, and compression artifacts were minimal. The ATI PC2TV also performed well on our Internet compression tests, while the All-in-Wonder's ratings were *good*.

Though ATI claims that both boards work with any off-the-shelf editor, the compatibility problems uncovered in our accompanying video editing story make this approach a hit-or-miss proposition. At press time, ATI was negotiating with a major software vendor to bundle a video editor with its products. Until then, this omission obviously limits the usefulness of either ATI board. For these reasons, you'll be better off building your capture and compression station around a more full-featured product.

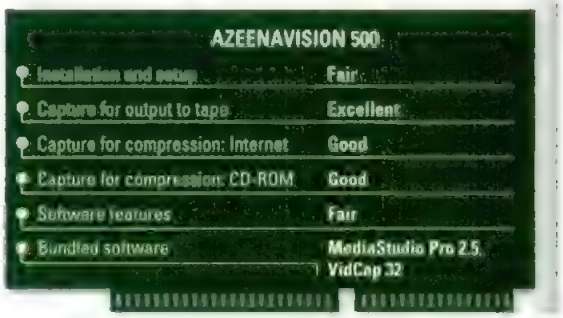
All-in-Wonder. Street price: $270. **ATI PC2TV.** Street price: $100. ATI Technologies Inc., Thornhill, Ontario, Canada; 905-882-2600; fax, 905-882-2620; www.atitech.com. *Circle 498 on reader service card.*

AzeenaVision 500

The AzeenaVision 500, from Azeena Technologies, is the Dr. Jekyll and Mr. Hyde of video capture. On our quality tests, it delivered exceptional results. But the AzeenaVision also was difficult to set up and use. Despite alluring video quality, this isn't a board for beginners. But if they're willing to put up with the frequent crashes we experienced, intrepid video developers seeking to push the envelope will be rewarded by extraordinary bandwidth and quality.

The AzeenaVision 500 capture system ($1,000 street) is a two-board set, with the vendor's PCI video capture board and the AVAudio board, an attached ISA board. The video board is also available on its own for $900 (street). On the bracket are one composite and two S-Video input jacks, as well as composite and S-Video outputs. Stereo audio input and output jacks, along with a stereo microphone jack, comprise the audio I/O. Included with the set is Azeena's Video Recorder software, which controls capture and playback of video files and provides machine control over source decks.

To install the AzeenaVision, you first have to configure your capture SCSI drives as removable. Also complicating matters is the lack of a Windows 95 audio mixer. After finding Azeena's custom sound mixer in its installation subdirectory, we were able to start capturing video. The AzeenaVision captures in Motion-JPEG and in 15-, 24-, and 32-bit RGB formats, with 320-by-240, 320-by-480, 640-by-240, and 640-by-480 resolutions. You set the capture data rate using one of four metrics, including kilobytes per second.



Incoming video adjustments include brightness, contrast, saturation, and hue, along with a video filter that is inadequately explained in the manual. Like most of the other boards we tested, Azeena's has a disk calibration utility for gauging the read/write capacity of your hard disk. Unlike other disk calibration utilities, however, Azeena's must delete all the files on the target hard disk to perform the calibration.

With VidCap 32, the AzeenaVision was fully capable of capturing at its claimed rate of 8 MBps. Unfortunately, at the highest capture rates we experienced frequent crashes and lost audio/video synchronization when writing out to tape. We settled for an impressive 6.23 MBps, which played back without a hitch. But when creating our jury test clip, we found that MediaStudio Pro 2.5 couldn't render the completed file, so we had to piece together clips captured in the 5- to 6-MBps range.

Even at the lower data rates, the AzeenaVision's video was virtually artifact-free, with only minor pulsing and aliasing. On our MPEG-1 and Internet jury tests, the AzeenaVision's video was a touch noisier and more blocky than the leaders in these categories.

AzeenaVision videos were responsive on the time line, speeding our editing tasks. But rendering our 75-second test file took just under 6 minutes, a fairly slow timing among Motion-JPEG boards.

The play-list function of Azeena's Video Recorder lets you queue up multiple files for playback to tape. You can insert color bars, tones, and limited transitions between videos and still images—all of which are rendered into temporary files before writing to the VCR. This function lets you circumvent the 2GB file limitation of the .AVI file format and create much longer videos than you could in MediaStudio Pro.

Written in 16-bit code to run under Windows 3.1 and Windows 95, the play-list function crashed frequently with high-bandwidth files, but it was relatively stable with files at about 2 MBps.

Azeena's engineers have found the secret to high bandwidth: high-quality video capture. Until they improve the software, however, this is a board best left to the pros.

AzeenaVision 500. Street price: Video board only, $900; with AVAudio board, $1,000. Azeena Technologies Inc., Long Beach, CA; 562-981-2771; fax, 562-427-0971; www.azeena.com. *Circle 499 on reader service card.*

Digital Video Arts WakeBoard

Although Digital Video Arts' WakeBoard ($1,000 street)offers some useful video capture features, its performance was marginal. If you plan to send video

NEW PRODUCT

intel inside
PENTIUM PRO PROCESSOR

The New HP NetServer LXr Pro and Rack Solution

Intel Pentium Pro 200 MHz processor with 512KB cache and up to four-way multiprocessing
Also available in 1MB cache versions
HP NetRAID PCI Disk Array Controller with three Ultra SCSI channels, connects up to eight drives per channel
Up to 10 I/O slots: six bus master PCI, four EISA (one EISA slot reserved for system)
LAN Support and Comprehensive Network Support available as HP SupportPack
128MB/512MB ECC memory expandable to 4GB
Three hot-swap Redundant Power Supply standard

Fastest four-way.* Over 1TB of storage.

Let's get ready to Rack.

www.hpresource.com/racks

*Based on benchmark numbers of 9,198 TPM. The Intel inside logo and Pentium are registered trademarks of Intel Corporation. ©1997 Hewlett Packard Company

HEWLETT® PACKARD

back out to tape, you should avoid the WakeBoard, since poor throughput degraded video quality to unacceptable levels. This product fared better on CD-ROM and Internet video tasks, but other vendors' boards reviewed here provide similar functionality and better video quality at lower cost.

The WakeBoard is a plug-and-play, bus-master half-board powered by the 8-by-8 MEP chip. A video-only board, the WakeBoard has S-Video and composite input and output connectors for capturing and printing back to tape. In addition to software drivers, Digital Video Arts bundles Ulead Systems' MediaStudio Pro 2.5 video editor and drivers for Intel's Indeo Video Interactive (IVI) codec.

Installing the board was relatively painless, though our early capture efforts were complicated by the fact that the manual refers to working with Adobe Premiere rather than MediaStudio Pro. The WakeBoard offers three capture formats: Wake video, a wavelet-based format for tape-bound applications; IVI format for real-time prototyping; and Intel's YVU9 mode with high-quality capture for compression.

Capture resolutions vary by format, from a high of 640-by-480 at 15 fps in Wake format to 160-by-120 at 30 fps in IVI format. You can capture Wake format only at 60 fields per second with a 320-by-480 resolution, which we used to create our print-to-tape jury file. We captured our MPEG-1 and RealVideo test clips at 320-by-240 resolution in YVU9 mode.

When capturing in Wake format, you control the incoming data rate using a slider bar with values ranging from 250 KBps to 3 MBps. To write back to tape, you load the edited file into Media Player and select the full-screen playback option.

In preparing our jury test tape, we stopped dropping frames during capture at about 2 MBps. But we couldn't print to tape without losing audio synchronization until we dropped the data rate to 1.3 MBps—by far the lowest rate in this roundup. When viewed on the computer, the individual video frames were faded and grainy with obvious loss of detail. Played back from tape, the clip exhibited significant aliasing, major blockiness, and minor pulsing during the still-image section. In other nonjury tests, the WakeBoard video showed occasional severe artifacting or blockiness around high contrast edges. This performance earned the board a *poor* rating in print-to-tape capabilities.

The WakeBoard was much easier to use when capturing for compression. In YVU mode, it captured at a relatively high bandwidth of 2.79 MBps. Not surprisingly, WakeBoard's performance improved to *fair* when it was capturing for Internet or CD-ROM distribution.

In MediaStudio Pro, working with Wake video felt extremely sluggish, making it difficult to select in and out points in the captured video. Moving a Wake video on the time line created gaps of 1 or 2 seconds while the screen bitmaps updated. Finally, it took more than 17 minutes to render the final test clip in MediaStudio Pro, over twice as long as the nearest capture competitor.

The WakeBoard performed well when capturing compressed IVI files for prototyping. In the talking-head sequence, the board captured at a 320-by-240 resolution at 15 fps, with an audio/video bandwidth of 162 KBps, while retaining good quality. Higher-motion sequences pushed the data rate to over 265 KBps, but video quality remained solid.

If you plan to distribute video on a CD-ROM or over the Internet, you'll find Intel's Smart Video Recorder III provides this same functionality, along with YVU9 capture, at a fraction of the WakeBoard's price. And because of the WakeBoard's relatively poor results on other tests, you'll probably want to look elsewhere for a complete capture solution.

WakeBoard. Street price: $1,000. Digital Video Arts Ltd., Dresher, PA; 215-576-7920; fax, 215-576-7932; www.dval.com. *Circle 500 on reader service card.*

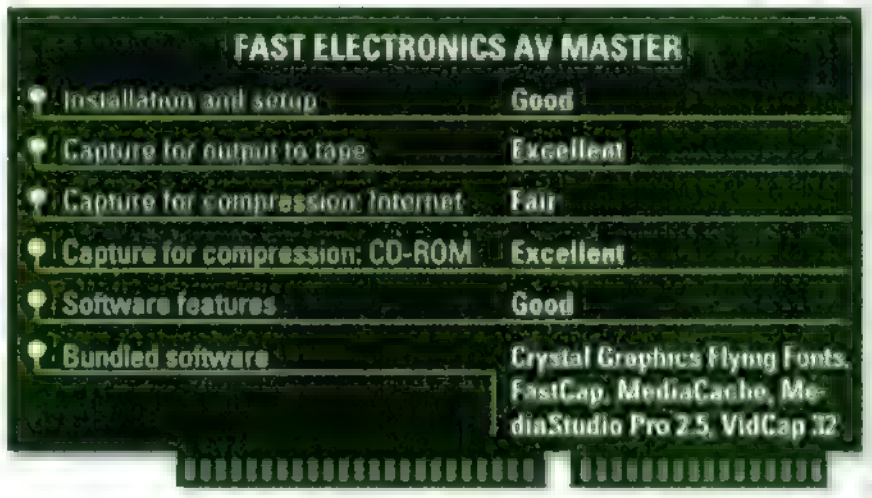
FAST Electronics AV Master

Introduced a year ago, FAST Electronics' AV Master ($800 street) is one of the top-selling capture cards, and our tests revealed why. The AV Master garnered *excellent* ratings on our print-to-tape and MPEG-1 tests, has an engaging capture interface, and boasts innovative tools for creating longer videos. If you're distributing video on tape or CD-ROM, the AV Master should be on your short list. It's not the best choice, though, if your target is the Internet.

This product captures audio and video with hardware A/V locking to ensure sound synchronization. The board ships with S-Video and composite video input and output connectors, as well as stereo input and output jacks. The AV Master runs under Windows 95 and NT and supports PAL and NTSC.

The video capture program, FastCap, is one of the few programs to improve on VidCap 32's functionality. FastCap's VCR-like capture controls are on a single toolbar, and a ribbon on the left catalogs the first frames of all clips stored on the capture drive. A meter measures incoming audio volume—a unique feature—and FastCap lets you play any file on the capture disk, a convenient addition.

The AV Master captures at 640-by-480 resolution for writing to tape, 320-by-480, and 320-by-240 for MPEG and .AVI compression, both in Motion-JPEG format. You adjust the capture data rate with a slider control; green, orange, and red zones represent safe, aggressive, and excessive capture rates, respectively. A new disk benchmark test utility measures the read/write capacity of your target capture drive and adjusts the recommended rates accordingly. Hue, brightness, contrast, saturation, and color adjustments round out the capture controls.



When printing video back out to tape,

The new Intel® Pentium® processor-based HP Vectra V and X Series PCs come with HP TopTOOLS:

Remotely upgrade the BIOS of multiple PCs* simultaneously

Remotely set DMI attributes on multiple PCs simultaneously

Remotely change administration BIOS passwords on multiple PCs simultaneously

Remotely collect asset data from any DMI enabled** PC

FROM $992'

How would you upgrade the BIOS of 250 PCs?

Find out how at our quick link: www.hpresource.com/vectra-3

HEWLETT® PACKARD

BENCHMARK TESTS

Video Capture Boards

We subjected all boards to a 5-minute torture test at full capture rate to determine read and write capacity. We then built jury test clips from a 75-second sequence containing a variety of sequences including a talking head, a high-action boat sequence, a green-screen video from Imagination Pilot's CD-ROM Eraser Turnabout, and four still images laid to tape. On our jury tests, we rated several discrete sequences in each clip on a scale of 1 to 3 for factors such as color fidelity, artifacting, and noise.

To measure a board's ability to write to tape, we captured the 5-minute test clip at the highest possible data rate without dropping frames and then wrote the video back to tape, recapturing if the board couldn't write back without dropped frames or lost synchronization. Then we built a 75-second test clip that included a 2-second title and four short sequences separated by dissolve transitions. We wrote the test video back to Hi-8 tape for our jury tests.

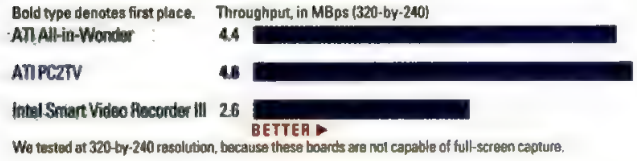
On our MPEG-1 jury tests, we captured the same 75-second sequence at the highest possible data rate, using a raw format when available or the board's compressed format. We encoded all test clips to MPEG-1 format using Xing Technology Corp.'s MPEG Encoder, Version 2.0.

On our Internet jury tests, we captured the 75-second sequence at the target resolution of 176-by-144, when available. Otherwise, we scaled down from the board's quarter-screen capture resolution. We used a raw-capture format when available or the board's compressed format. We encoded all of the test clips using Progressive Networks' RealVideo Encoder.

We tested these digital video capture boards on a Micron Millennia PC with a 200-MHz Pentium processor and 32MB of EDO RAM, equipped with the Diamond Stealth 3D 2000 graphics adapter (the ATI and Matrox boards included their own graphics cards). We did all of our video capture with a Seagate Cheetah 4LP 10,000-rpm hard disk driven by Adaptec's AHA-2940 Ultra Wide SCSI adapter. The analog source for all of our tests was Sony Electronics' CVD-1000 Hi-8 deck with S-Video input.

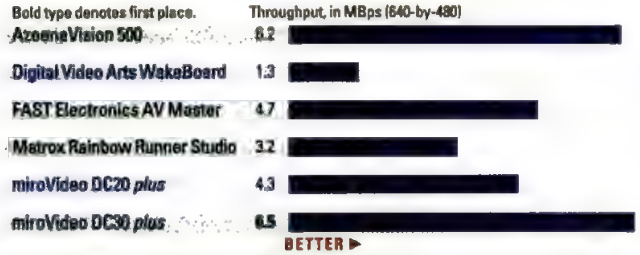
Our source tape was built by rendering test clips from Beta-Cam to Hi-8 format. We prepared multiple masters of the test tape, and no master was used for more than two boards. We performed all capture, editing, and writing-to-tape functions with the software bundled with the individual boards. We used Ulead Systems' MediaStudio Pro 2.5 with the ATI boards. Audio quality for all captures was set to 44.1-kHz, 16-bit stereo.

Capture for Compression



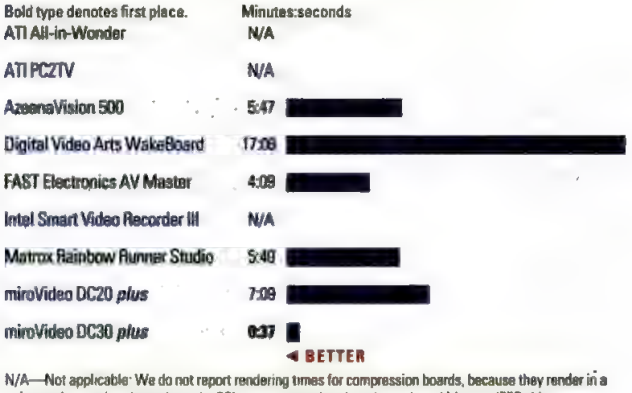
We tested at 320-by-240 resolution, because these boards are not capable of full-screen capture.

Nonlinear Editing



We tested by capturing at full-screen resolution (640-by-480), which is more demanding than capturing at 320-by-240 and is a better measure of a board's capacity.

Rendering Time



N/A—Not applicable. We do not report rendering times for compression boards, because they render in a software format that depends on the PC's processor rather than the on-board Motion-JPEG chip.

the AV Master was impressive. FastCap, Version 2.0, works with files up to 2GB, avoiding the 1GB file limitation of MCI (Media Control Interface). Alternatively, you can write to tape with other programs by loading the MediaCache utility.

Working with FastCap, we captured, edited, and printed videos out to our Hi-8 deck at a respectable 4.67 MBps. The video was especially clean, with occasional minor aliasing and pulsing but no banding, blockiness, or color shifting.

Though capture for CD-ROM distribution was similarly successful, the process was more circuitous. For some reason that FAST Electronics couldn't duplicate or explain, files captured at 320-by-240 resolution became extremely pixelated when output in raw format for MPEG encoding. Instead, we captured at 640-by-480 and subsampled down to 320-by-240 in Xing Technology's MPEG Encoder. Again, FASTcap produced exceptionally clean files. Scaling down to 176-by-144 resolution for RealVideo produced aliasing and similar artifacts in the compressed video.

By the time you read this, FAST Electronics should have replaced the bundled editor, MediaStudio Pro 2.5, with MediaStudio Pro 5.0. During editing, captured videos felt slightly sluggish. And though video bitmaps appear on the timeline, they don't show in the clip window—only on the NTSC monitor. This arrangement forces you to watch video on one monitor while manipulating controls on another.

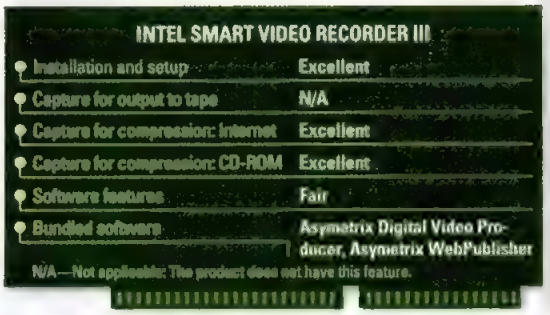
The HP 300 Series Palmtop PC
Featuring the widest screen so you can view information like you would on your desktop PC
VGA wide screen: 640 x 240 pixels
Direct print capabilities through an infrared connection
Wireless e-mail and Internet access via Type II PC Card Modem*
Fast and easy synchronization with your desktop PC
From $499†

The problem with most handheld PCs is that the screen isn't wide enou

To get the whole picture, see our quick link: www.hpresource.com/palmtop-3

*Optional accessory available at additional price †Projected U.S. street price Microsoft and Windows CE are U.S. registered trademarks of Microsoft Corporation. ©1997 Hewlett-Packard Company PPG450

HEWLETT® PACKARD



Rendering the 75-second project took 4 minutes 9 seconds—faster than most, but not on a par with the category leader.

New in FastCap 2.0 is a play list that lets you queue and smoothly play multiple video files to avoid the 2GB .AVI file-size limitation—an extremely desirable feature. The play list is not without limitations, though, such as the requirement that all its files reside on the same drive.

The AV Master is a workhorse with an extremely strong feature set. Unless your primary distribution target is the Internet, consider this product seriously.

AV Master. Street price: $800. FAST Electronics U.S. Inc., Foster City, CA; 800-249-3278, 415-295-3500; fax, 415-345-3447; www.fastmultimedia.com. *Circle 501 on reader service card.*

Intel Smart Video Recorder III

The Intel Smart Video Recorder III ($199 list) excels at capturing files for CD-ROM and Internet distribution and is a breeze to install and set up. Though Intel has significantly advanced the hardware capabilities, the bundled video editor remains rooted in the past. This makes the ISVR3 most suitable for developers who own other video editing programs or for beginners seeking an inexpensive entrée into digital video editing.

The ISVR3 is a plug-and-play PCI board built around Brooktree's Bt848KPF Video Decoder chip. The video-only board has composite and S-Video input jacks but no video-out ports, making it unsuitable for developers seeking to distribute video in analog tape formats.

Installing the ISVR3 was exceptionally easy, and we were capturing video in under 10 minutes. The ISVR3 captures at any arbitrary resolution from 32-by-24 to 640-by-480 in 24-bit RGB, YVU9, and IVI compressed formats. These capture formats let the board serve two roles, capturing at high bandwidth for subsequent recompression or lower bandwidths for real-time prototyping. Software controls let you adjust incoming brightness, contrast, saturation, hue, and quality levels when capturing in compressed format.

The bundled Asymetrix Digital Video Producer's Capture is a simple program that provides all the basics but has no advanced features, such as disk benchmark-test utilities. Nonetheless, the ISVR3 performed well on our capture tests, capturing at 30 fps at 320-by-240 resolution in YVU9 format with CD-quality audio at 2.62 MBps.

The ISVR3 was also one of the few boards that could capture directly into 176-by-144 resolution for our RealVideo tests, which contributed to an *excellent* rating. In general, the ISVR3's RealVideo clips were clearer than those produced by other boards, with slightly fewer artifacts. The MPEG-1 clips were crisp and sharply detailed, with stable images and limited noise.

The ISVR3's most significant flaw is its bundled editor, Digital Video Producer, Version 4.0, which needs updating. Asymetrix declined to participate in our accompanying software roundup. DVP is slow, supports only two audio/video tracks, and is limited in functionality, compared with Adobe Premiere or MediaStudio Pro. It's also subject to crashing when you work with large files. On a positive note, the ISVR3's ability to capture in compressed IVI format is an extremely useful feature for prototyping and high-bandwidth applications, such as kiosks.

In general, the ISVR3's video quality, ease of installation, and general stability make it the ideal second board for capturing files to compress and distribute over the Internet or on CD-ROM. Those looking for a complete capture and editing bundle, however, should look elsewhere.

Intel Smart Video Recorder III. List price: $199. Intel Corp., Hillsboro, OR; 800-628-8686, 503-264-7354; fax, 503-264-6157; www.intel.com. *Circle 502 on reader service card.*

Matrox Rainbow Runner Studio

PC MAGAZINE EDITORS' CHOICE

The idea of buying a capture board/graphics board combination may sound strange, but Matrox Graphics' Rainbow Runner Studio is poised to win over any skeptics. The Rainbow Runner is one of the few boards that could be installed without hardware conflicts, and it performed extremely well in our high-quality benchmark tests. Throw in a price tag of $200 (street) for the daughterboard alone, or $370 for the Mystique/Rainbow Runner combo, and this single-PCI-slot solution starts to make a lot of sense. As a bundle for beginners, the Rainbow Runner can't be beaten.

The Rainbow Runner is a daughterboard for Matrox's Mystique 220 graphics board, using a shared-frame-buffer architecture with video I/O supplied by a dedicated port on the Mystique bracket. This video-only board is powered by the Zoran ZR 36060 Motion-JPEG chip set and includes both S-Video and composite I/O ports.

Matrox takes great pains to ensure trouble-free installation, starting with a handy quick-install card and a comprehensive manual. After driver installation, a benchmark test utility automatically gauges your hard disk's performance. Next, a Quick Connect program asks a series of questions to ensure that all cables are connected to the proper peripherals and correctly configured.

The Rainbow Runner captures in Motion-JPEG and 8-, 16-, and 24-bit RGB formats with resolutions ranging from 40-by-30 to 704-by-480, including 176-by-144 and 320-by-240. You can adjust the incoming video for saturation, brightness, contrast, hue, and sharpness.

Matrox recommends capturing with

Waste time waiting for downloads, and how do you feel?

At nearly twice the speed of 28.8 modems, x2™ Technology is very cool.

Slow downloads got you steamed? Take a deep breath, count to three and say x2™ Technology.

Megahertz® PC Card Modems (formerly from U.S. Robotics) include x2 Technology so now you can download information at up to 56Kbps** over standard phone lines and receive faster, more reliable connections than standard v.34 modems. Good news, since being knocked off-line can really make you boil.

There's no need to wait for x2 connections, either. Over 650 ISPs and online services already offer live x2 service in 2,500 cities. And you're even guaranteed a free upgrade* to the 56Kbps ITU-T standard after it's adopted.

Just what you'd expect from 3Com, the company that connects more people to the Internet than any other.

Learn more from our x2 Mobile Technology Brief. To get yours, call 1-800 LINKING, EXT. 4333, or visit us at www.USR.com/mobile today. Otherwise, your productivity could be put on the back burner.

Besides our XJACK® connector, our latest x2™ Technology PC Card modem includes Direct Connect Cellular, Fax and Mobile Speakerphone† capabilities

Megahertz. From the leader in networking. 3Com®

1997 3Com Corporation. All rights reserved. Portions of this product are covered by U.S. Patent Nos. [illegible] 5,574,401, and 5,532,989. 3Com and the 3Com Logo, Megahertz and XJACK are registered trademarks and X2 and the x2 [illegible] or its subsidiaries.

**Note: all x2 products are 56Kbps capable; however, due to FCC rules, maximum download speeds are limited to 53Kbps. [illegible] vary. Uploads travel at speeds up to 28.8Kbps. Requires x2 capable modem, x2 compatible analog phone line and [illegible] capable [illegible]. See www.usr.com/x2 for details.

*Free upgrades available on models nos. XJ1560, QC1560, XJ5bis, and [illegible] June 30, 1998. U.S. and Canada only. †Notebook with Windows 3.1x or Windows 95, speaker, microphone and sound capabilities required. Spectrum Connected, Inc. is a trademark of Spectrum Information Technologies.

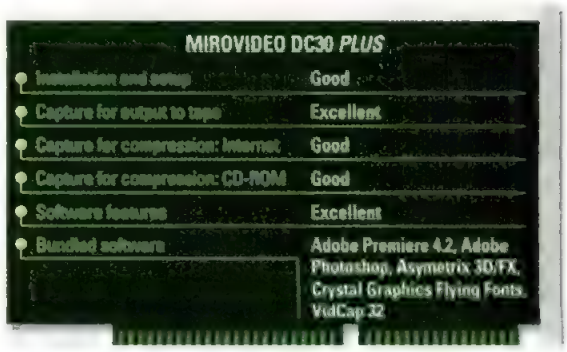
SPECTRUM Connected™

its PC-VCR program, which resembles a VCR remote control and should be fairly simple even for beginners. PC-VCR automatically selects many configuration options, such as capture resolution, frame rate, and incoming data rate, according to more general user inputs, such as lower disk usage or higher video quality, or based on hard disk performance statistics measured during installation. More advanced developers may prefer using Ulead Systems' included MediaStudio Pro, which provides full control over these configuration options. But neither software program shows drop-frame status during capture—an irritation for producers seeking to optimize capture rates.

During our 5-minute torture test, the Rainbow Runner captured at 3.16 MBps and wrote back to tape without a problem. While we were preparing our jury tape, however, the Rainbow Runner had problems capturing one particular sequence. This forced us to drop the data rate for that particular segment to around 2.6 MBps. Nonetheless, the product received high marks across the board on our jury tests. On the MPEG-1 jury tests, the Rainbow Runner received one of two perfect scores in this category with its noise- and artifact-free video. It also received an *excellent* rating on our Internet tests, clearly benefiting from the ability to capture in raw 24-bit format at the target resolution of 176-by-144.

On the software front, the Rainbow Runner worked well with MediaStudio Pro, proving very responsive on the time line—though rendering time was an average 5 minutes 40 seconds. Matrox currently offers no solution to either the 1GB MCI or 2GB .AVI file-size limitations, but help for both is coming in the form of cut-list editing in a future version of MediaStudio Pro. This feature will let the Rainbow Runner print to tape from MediaStudio Pro's time line without first rendering the entire movie. Though individual video components must be smaller than 2GB, collectively they can extend beyond this limitation.

Matrox has a history of producing sophisticated digital video editors for the professional market and well-featured, high-performance mainstream graphics boards. In the Rainbow Runner, the company skillfully combines these two capabilities to produce a compelling digital video-editing solution for the rest of us. **Rainbow Runner Studio.** Street price: $200; Mystique/Rainbow Runner Combo Kit, $370. Matrox Graphics Inc., Dorval, Quebec, Canada; 800-361-1408, 514-969-6320; fax, 514-969-6363; www.matrox.com. *Circle 503 on reader service card.*



miroVideo DC20 *plus*, miroVideo DC30 *plus*

PC MAGAZINE EDITORS' CHOICE

Market leader miro Computer Products has two entries in our roundup, the miroVideo DC30 *plus* ($999 list) and the miroVideo DC20 *plus* ($599 list). The differences between the two boards are significant. The DC30 *plus* has on-board audio, posted an *excellent* rating in output-to-tape quality, ships with Adobe Premiere 4.2, and includes an elegant solution for building movies larger than 2GB. By contrast, the DC20 *plus* lacks on-board audio, achieved a *good* rating in nonlinear quality, and ships with MediaStudio Pro 5.0 VE with MPEG. Only the most price-conscious videographer would choose the DC20 *plus* over the DC30 *plus*.

In addition to audio and video capture, the DC30 *plus* includes on-board digital signal processors (DSPs) that accelerate the display of video thumbnails, preview, and rendering. The board supports NTSC, PAL, and SECAM and includes S-Video and composite in and out jacks and a custom audio connector leading to four labeled stereo jacks. The DC20 *plus* is configured similarly, but it does not include the on-board audio.

Installing both boards was simple, but as with several boards, we had to change address settings manually. Installation culminates with miro's sophisticated configuration and disk benchmark test utility, which converts disk performance statistics to recommended settings presented in the capture interface.

Both boards capture solely in Motion-JPEG format in a range of resolutions from 640-by-480 to 288-by-216, including 320-by-240. Slider bars adjust the brightness, contrast, saturation, and sharpness of the incoming video, as well as the capture bandwidth, which you can set by specifying either a compression ratio or a data rate.

On the DC30 *plus*, you adjust incoming audio volumes using the familiar Windows 95 audio controller, conveniently launched by double-clicking on the speaker icon on the right of the Taskbar. In operation, we had difficulty achieving the proper levels, causing our audio to sound slightly tinny and metallic.

The DC30 *plus* captured at 6.5 MBps but couldn't smoothly print to tape until we dropped the bandwidth to 6.1 MBps. At that rate, the DC30 *plus* produced high-contrast video with clear color fidelity and few visual artifacts, and it merited an *excellent* rating. We also gave this product *good* ratings on our MPEG-1 and RealVideo tests.

The DC20 *plus* captured and printed to tape at 4.3 MBps. On our print-to-tape tests, it received a *good* rating, but the margin of difference among the top five boards was extremely difficult to distinguish. In MPEG-1 comparisons, the DC20 *plus* received another *good* rating and a score of *fair* on the RealVideo jury tests.

Miro also has an elegant solution for managing preview functions and printing

Choose a modem that can't adapt, and where does that leave you?

Unlike internal modems, Megahertz® PC Cards are easy to upgrade.

Will your next modem let you upgrade to future speed standards or easily add new features? If it's an internal modem, probably not. And should it require service, guess who's left hanging without a notebook?

Fortunately, when it comes to high-speed access, no products give you as much flexibility as our PC Card modems. Simply slide in a different card to add new capabilities.

Only Megahertz® PC Cards (formerly from U.S. Robotics) offer so many advanced features. Besides our patented XJACK® connector, there's Fax capabilities, Direct Connect Cellular with Cable Sensor, Digital Line Guard and Mobile Speakerphone†. What's more, our x2™ Technology lets you down load information up to twice as fast as 28.8 modems, and you also get a free upgrade* to the 56Kbps** ITU-T standard after it's adopted.

Learn how Megahertz PC Cards stack up against internal modems. For a free Technology Brief, call 1-800 LINKING, EXT. 4332, or visit www.USR.com/mobile today. Otherwise, you could find yourself hung out to dry.

From ISDN and Ethernet•Modem combo cards to x2 Technology. Megahertz® modems keep your options wide open.

Megahertz® From the leader in networking. 3Com®

1997 3Com Corporation. All rights reserved. Portions of this product are covered by U.S. Patent Nos. 5,183,404, 5,336,099, 5,338,210, 5,574,401, and 5,532,989. 3Com and the 3Com Logo, Megahertz and XJACK are registered trademarks and X2 and the x2 logo are trademarks of 3Com Corporation or its subsidiaries.

**Note: all x2 products are 56Kbps capable; however, due to FCC rules, maximum download speeds are limited to 53Kbps. Actual speeds may vary. Uploads travel at speeds up to 28.8Kbps. Requires x2 capable modem, x2 compatible analog phone line and x2 capable service provider. See www.usr.com/x2 for details.

*Free upgrades available on model nos. XJ1560, CC1560, XJ5560 and CC5560 through June 30, 1998. U.S. and Canada only. †Notebook with Windows 3.1x or Windows 95 speaker, microphone and sound capabilities required. Spectrum Connected, Inc. is a trademark of Spectrum Information Technologies.

SPECTRUM Connected™

Seeing Digital

From audio recordings to answering machines, the world has gone digital. But the ubiquitous S-VHS and Hi-8 camcorders we use to record everything from baby's first steps to business conferences remain anchored in analog waters. All that's beginning to change. A consortium of camcorder manufacturers have developed Digital Video camcorder specifications.

DV camcorders look, feel, and operate almost exactly like traditional analog camcorders. Both systems incorporate photo-sensitive CCDs (charge-coupled devices) instead of film, and both can save or display images and sounds to any television set or VCR. Also, depending upon the model, both offer similar special features, such as zoom/auto-focus lenses, electronic image stabilization, slow motion, single-frame capability, oversized color LCD viewfinders, and so on.

There are, however, two major differences between analog and digital camcorders: image quality and computer smarts. Consumer analog camcorders record video on relatively large and bulky VHS or Hi-8 cassettes at a resolution of about 250 lines per inch, and professional-quality, broadcast-standard NTSC or PAL Betacam camcorders record at 330 lines per inch. By contrast, DV camcorders record pixel-based images on matchbook-size digital tape cassettes at a resolution equivalent to more than 500 lines per inch. That, plus significantly lower signal-to-noise ratios, dramatically better sound, and far fewer artifacts, means that the least expensive consumer DV camcorders can produce better-quality video and sound than the best professional analog camcorders.

Digital camcorders such as these from Panasonic and JVC eliminate analog-to-digital capture.

Conventional camcorders require special equipment to convert analog video to digital data. These video-capture boards are the focus of our main feature. Depending on the model, DV camcorders upload video directly to the computer through a high-speed 1394 FireWire board (see "FireWire Boards," later in this section) or indirectly transfer data through a DV tape deck or DV drive.

As might be expected, DV technology isn't cheap. At $1,400 for consumer models and $23,000 for professional-level devices, DV camcorders currently cost significantly more than analog camcorders.

The Panasonic PV-DV1000 ($4,199.95 list) is somewhat typical of consumer DV camcorders. It's a small, sophisticated device with 36 buttons, knobs, and switches. The PV-DV1000 is an immensely complicated camera that is often difficult to use. But it offers an impressive range of pro studio features. What the Panasonic (as well as most consumer DV camcorders) doesn't have is a built-in FireWire port. To transfer images to a computer, you'll need to buy a DV tape drive or camcorder.—*Daniel Grotta and Sally Wiener Grotta*

to tape. The DC30 *plus* Control utility runs whenever the board is engaged, toggling the output between the screen and the board's output ports. During capture, miro uses a PCI overlay to preview video in the capture window, an arrangement that worked flawlessly.

When you're ready to write to tape, you select either S-Video or composite output in the DC30 *plus* Control and load your file into Media Player, choosing the miro .AVI cache player option as the file type. This engages the playback cache, avoiding the 1GB MCI limitation.

New in the DC30 *plus* is miroInstant Video, a feature that saves disk space and rendering time and works around the 2GB .AVI file-size limitation. Selected as an export function from within Adobe Premiere, this feature plays the video directly from Premiere's time line after first rendering all effects, transitions, and titles. By contrast, most other boards require a complete rendering of the finished file. For example, when we built our test clip using miroInstant Video, we were able to cut down the rendering time to 37 seconds. The closest competitor required 4 minutes 9 seconds. The process also created only 30MB in temporary files, as compared with the 465MB the fully rendered 75-second movie would have required.

The DC20 *plus* has its own software strong points, such as Sonic Foundry's excellent Sound Forge audio editor. But though MediaStudio Pro will ultimately be an impressive performer, it was not quite ready for prime time on our tests. It crashed frequently and failed to recognize its own project files, forcing us to rebuild our test file several times. The DC20 *plus* was also very responsive on the time line but rendered our project in 7 minutes 9 seconds, which was slow compared with most of the other boards we tested.

The DC20 *plus* features the same preview and print-to-tape functions as the DC30 *plus*, as well as the same ability to work with files over 1GB. But miro has no plans to port the miroInstant Video features to the DC20 *plus*.

Although the DC20 *plus* has some strengths, it pales in comparison to its more full-featured sibling. In terms of feature set, responsiveness, stability, and ease of use, the DC30 *plus* is a clear leader in this category.

miroVideo DC20 *plus*. List price: $599. **miroVideo DC30 *plus*.** List price: $999. miro Computer Products Inc., Palo Alto, CA; 800-249-6476, 415-855-0955; www.miro.com. *Circle 504 on reader service card.*

Now that APC Smart-UPS® includes FREE web-enabled PowerChute® *plus*, protecting network uptime has never been easier

PC Magazine EDITORS' CHOICE
November 14, 1996
APC Smart-UPS 1000

"...Inherent flexibility and excellent software... Don't be caught without one."

Protect ME! APC

Power problems attack networks relentlessly. To protect hardware and data from system crashes, experts, network managers and computer users worldwide prefer one solution above all others combined: APC Smart-UPS. Now, all 120V Smart-UPS include FREE PowerChute *plus* power management software.

The most reliable protection you can buy

Smart-UPS provide complete protection against power spikes, surges, brownouts, and blackouts. You'll also gain maximum server uptime and decrease management costs. Award-winning features include:

- CellGuard™ intelligent battery management monitors battery performance and extends battery life.
- SmartSlot™ internal accessory slot lets you customize and enhance the performance of your Smart-UPS.
- QuickSwap™ user-replaceable batteries can be quickly and safely swapped out without powering down the connected equipment.

PowerChute plus provides unattended system shutdown and UPS management for Windows NT, Netware and other servers. Manage Smart-UPS via SNMP, DMI and Web browsers (shown above). Features vary by operating system.

Plan for and control crisis situations

PowerChute *plus* FlexEvents™ lets you control UPS reactions to power events. You can configure PowerChute *plus* to provide graceful, unattended server shutdown during an extended power outage or alert you to out-of-bounds environmental conditions before they result in costly downtime.

Web server and SNMP ready

APC's NEW WebAgent™ allows you to monitor and manage your Smart-UPS using your Web browser. New WebAlert™ notifies users of Web server shutdown via their browser. PowerChute *plus* also includes the PowerNet™ SNMP Agent plug-in, which allows you to integrate your Smart-UPS with your existing SNMP management strategy.

Smart-UPS and PowerChute *plus* provide the complete solution in one convenient box. Server protection and peace of mind have never been easier.

Trade-UPS!

Fax or mail this coupon to APC and learn how you can easily trade in your old UPS for discounts towards a new Smart-UPS.

☐ **YES!** I'm interested in trading up a competitors' or an older APC UPS to Smart-UPS. Please send Trade-UPS info.

☐ **NO** I'm not interested at this time but please send my FREE power protection handbook.

Name: _____

Title: _____

Company: _____

Address: _____

_____

City/Town: _____

State: _____ Zip: _____ Country _____

Phone: _____

Brand of UPS used? _____ # _____

Brand of PCs used? _____ # _____

Brand of Servers used? _____ # _____

APC

(888) 289-APCC x8197
Fax: (401) 788-2797
http://www.apcc.com

Dept. E4-80

©1997 APC. All Trademarks are the property of their owners. SU01EF • (800)347-FAXX PowerFax • CompuServe GO APCSUPPORT • 132 Fairgrounds Road, West Kingston, RI 02892 USA

APC has won more awards for reliability than all other UPS vendors combined.

CIRCLE 342 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

MPEG ENCODERS

In our previous desktop video feature (April 11, 1995), we hailed MPEG as a hot technology but noted that its hardware requirements limited its playback functionality. Of course, the ink was barely dry when software-only players appeared. And in the intervening years, MPEG—a video compression technology formulated by the Motion Picture Experts Group—has become popular for all types of video publishing, including Internet video.

MPEG-1 is a standard incorporating both audio and video. At virtually all data rates, it provides better audio/visual quality than codecs such as Cinepak and Indeo, and it enables playback on a variety of platforms. For NTSC video, MPEG-1 uses 352-by-240 resolution at 30 frames per second, as specified by the Standard Image Format (SIF); audio is 16-bit and in stereo, sampled at 44.1 kHz.

IN THIS REVIEW

Darim MPEGator 204
Data Translation Broadway 205
DV Studio Apollo2 MPEG-1 and Decoder 208
LA Vision Snazzi 208
Optibase MPEG Showsite 210
How We Tested 212

Software-only MPEG-1 players appeared in 1995, delivering close to 30 frames per second on Pentium/133 PCs. Last year Microsoft released a new multimedia architecture named ActiveMovie and recently renamed DirectShow, which includes the ability to play MPEG-1 videos.

Three techniques are available for creating MPEG-1 files on a computer. Software-only products such as Xing's MPEG-1 Encoder work with the output of standard capture cards, converting 1 minute of .AVI video into MPEG-1 format in roughly an hour—or faster if you have an MMX processor. Real-time MPEG-1 encoders accept composite or S-Video input from an analog source and convert it to finished MPEG-1 format in one easy step. And providing some of the advantages of both of these options are two-pass encoders, which first capture to .AVI format (usually mislabeled "editable MPEG"), so you can edit the video using Adobe Premiere or another tool and then "transcode" it to MPEG-1 format. The capture chips on most two-pass encoders make the final encoding step roughly three times as fast as with software-only products.

Our roundup includes five real-time boards—Darim's MPEGator, Data Translation's Broadway, DV Studio's Apollo2 MPEG-1 and Decoder, LA Vision's Snazzi, and Optibase's MPEG ShowSite—ranging roughly from $400 to $1,500. The Apollo2, the Broadway, and the MPEGator also support two-pass encoding.

Among low-cost boards, sound synchronization and playback compatibility are critical issues; earlier generations of inexpensive encoders had problems with both. This time, all the encoders passed our synchronization and compatibility tests with flying colors, even those without on-board audio.

Another issue involves the difference between square- and rectangular-pixel formats, which relate to the aspect ratios used by NTSC devices and computer monitors. The MPEG-1 committee specified 352 by 240 pixels, roughly one-quarter of NTSC's 720-by-480 resolution. When you play a 352-by-240 video on an NTSC monitor, it looks normal, but computer monitors use a 640-by-480 aspect ratio—the square-pixel format—so that playing a 352-by-240 (rectangular-pixel) image on a VGA monitor makes it look stretched by about 10 percent. For this reason, using 320-by-240, or square-pixel output, is better for videos bound for computer monitors.

Next up is format quality, which we tested by creating and comparing files from identical video footage. Finally, when you throw in other factors—such as stability, price, feature set, and usability—the differences between MPEG encoders become clear. Read on to find out which one is likely to be best for your desktop video system.

Darim MPEGator

Darim Co.'s MPEGator ($1,495 list) provides the roundup's best real-time 320-by-240 output and has a comprehensive and easy-to-use feature set, but installation is a potential minefield. The product is definitely worth a look if you're after complete control over MPEG-1 compression parameters and know your way around the Windows 95 System Properties dialog.

The MPEGator is a plug-and-play PCI half-board based on the Array Microsystems VideoFlow chip set, with audio and video encoding capabilities. Compatible with NTSC and PAL, it comes with Darim's capture and control application M-Coder, which runs under Windows 95 and Windows NT 4.0.

Configured with S-Video and composite video inputs, the MPEGator accepts stereo input and passes audio to your sound board for audio preview. It was exceptionally I/O-intensive in our testing, requiring an interrupt, three memory ranges, and one I/O range—a combination that befuddled the plug-and-play functionality and forced us to change five of the six settings. By contrast, software installation was smooth.

The MPEGator functions in real-time and two-pass compression modes. All capture operations take place from M-Coder, which resembles Media Player but has a preview window. Its humble appearance, though, belies the functionality within. M-Coder is fully featured and highly usable, offering the convenience of canned and user-configurable capture and compression templates, as well as the power of precompression filtering and of the ability to adjust MPEG-1 values such as GOP (group of pictures) size and intraframe bit-rate control.

Darim provides niceties such as offset controls for centering video in the capture

window, along with expected features such as adjustments for hue, saturation, contrast, and brightness—albeit without digital values, which would simplify experimentation. The MPEGator is the only encoder we reviewed to offer both square- and rectangular-pixel output in real-time mode, a capability making it ideal for CD-ROM title development and VideoCD publishing.

You capture using VCR-type controls. The MPEGator is one of the few products that enable you to pause and later resume capture, a feature that lets you concatenate multiple clips into one MPEG-1 file. After capture, a single click converts M-Coder into a simple playback application for viewing your captured file.

Although the MPEGator works in two-pass mode, we couldn't jury-test two-pass quality because of a bug that wasn't fixed until after we finished our comparisons. In square-pixel mode, the board's real-time MPEG-1 files were among the best in the roundup, with only moderate noise and little evidence of artifacting.

Simple enough for a beginner but with sufficient feature depth for advanced users, the MPEGator is the answer for high-quality, real-time square-pixel output. Just be prepared to roll up your sleeves during installation.

MPEGator. List price: $1,495. Darim Co. Ltd., Los Angeles, CA; 888-438-6734; fax, 213-637-1705; www.darvision.com. *Circle 507 on reader service card.*

Editors' Choice: MPEG Encoders

• Data Translation Broadway

Like a skilled actor, the Broadway can handle a variety of roles. For example, this hardware MPEG encoder from Data Translation is capable of operating in both real-time and two-pass modes. And it can encode in both square- and rectangular-pixel formats, so you can encode video for both computer screens and NTSC monitors with equally good results. The PCI board accepts both S-Video and composite input (NTSC and PAL) and can even print video back to tape. This unusual flexibility makes the Broadway well suited to virtually any MPEG-1 encoding task. The Broadway was also easy to install. Data Translation provides thorough documentation and a quick-start tutorial.

In addition, the Broadway was the only encoder to earn *excellent* ratings in the two-pass-mode jury tests (at both 352-by-240 and 320-by-240). In two-pass mode, it lets you capture video at 352-by-240, at a rate of 1.25 MBps. A capture and encoding chip from C-Cube, the CL 4110, makes final encoding in two-pass mode about three times as fast as in real-time mode.

The Broadway performed well on the real-time jury test, too, earning a rating of *good*. The Broadway includes Data Translation's capture and compression software as well as Ulead Systems' MediaStudio Pro 2.5, for editing chores.

Two other products deserve honorable mention. Darim Co.'s MPEGator is the power user's MPEG encoder and the only encoder we reviewed to offer both square- and rectangular-pixel output in real-time mode. Only installation glitches and the group's highest price tag kept it from sharing the Editors' Choice honors. Finally, LA Vision's Snazzi, which shipped just in time for our story, breaks the price barrier at $400 and is well designed for the consumer market.

Data Translation Broadway

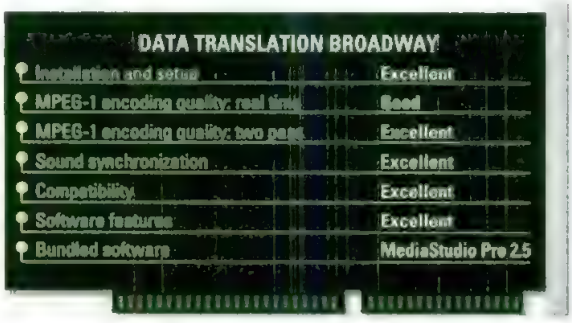
Data Translation wants to make MPEG encoding easy, and it largely succeeds with the Broadway ($995 list). Even better, the board produced great-looking MPEG-1 files that topped the charts in our quality tests. With both two-pass and real-time operation, the Broadway is also flexible, a trait that makes it a great choice for virtually any MPEG-1 encoding task.

The Broadway is a PCI bus-master half-board built around a new capture and encoding chip from C-Cube, the CL 4110. The board accepts S-Video and composite input in NTSC and PAL formats, and it prints video back to tape (a feature we did not test). Data Translation provides drivers for Windows 95 and Windows NT 4.0, the Broadway's own capture and compression software, and MediaStudio Pro.

Data Translation takes great pains to simplify installation and operation, providing a quick reference card, a comprehensive manual, and a quick-start tutorial. Even MPEG-1 novices should be up and running in minutes.

The Broadway has two modes, real-time and two-pass, with the C-Cube chip making final encoding in two-pass mode up to three times as fast as with real-time mode. In both modes, capture and compression take place via Data Translation's encoding utility, a functional and easy-to-use program that customizes options according to which capture mode you're using. You can adjust video data rate, audio parameters, and the hue, saturation, intensity, and contrast of incoming video. To correct small incompatibilities with the incoming signal, you can enable or disable a softening filter and clip lines from the bottom of the video during capture.

In two-pass mode, you capture to .AVI format in 352-by-240 resolution at a maximum rate of about 1.25 MBps. You can cut and paste video clips within the capture and compression software, or you can save the .AVI file and edit externally. Either way, you compress to MPEG-1 format in the capture and compression



©1997 Unisys Corporation. Aquanta is a trademark of Unisys Corporation. The Intel Inside Logo and Pentium are registered trademarks of Intel Corporation. Windows NT is a registered trademark of Microsoft Corporation. All brands and product names are trademarks or registered trademarks of their respective owners.

Making Windows NT® a big part of your show? We've got a world of supporting players.

Could be, your organization will soon be the scene of a major transformation to Windows NT.

In which case you must be wondering what and how and who could help make this event go smoothly.

The simple answer to all these questions: Aquanta.™ This line of servers for Windows NT brings you a range of systems from the entry level to the world's first 10-processor model.

AQUANTA

It also brings you a multitude of experts who can help you evaluate, consolidate and migrate across your enterprise. No matter what you're running now, where it is on earth or whose name is on it.

There's more. Our experts have strategic technology partnerships (see list at right) with virtually all the industry leaders, allowing us to offer what might be most important of all: complete responsibility for making the whole production a success.

Click www.aquanta-systems.unisys.com.

UNISYS

When information is everything.

AQUANTA XR/6 SERVER

The first enterprise server for Windows NT with up to ten 200 MHz Pentium® Pro processors. High-performance system bus. Up to 8GB ECC memory and 20MB L3 cache. Internal RAID. Hot-pluggable drives, power and cooling. And VisiNet-II systems management software.

AQUANTA HS/6 SERVER

Engineered for maximum availability, the HS/6 offers up to six 200 MHz Pentium Pro processors. Dual peer PCI/EISA bus. Six RAID-ready bays. 12 slots. And up to 4GB ECC memory and 512KB L2 cache. Plus VisiNet-II systems management software. Rackmount also available.

BEA

COMPUTER ASSOCIATES
Software superior by design.

INFORMIX®

intel

Microsoft

ORACLE

PROGRESS SOFTWARE

SYBASE

Tivoli

VINCA
The Data Protection Company™

www.aquanta-systems.unisys.com

CLICK HERE
to find out about our full line of Aquanta products.
CIRCLE 008 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

software, which provides several presets, including VideoCD and low bit-rate video for Internet delivery. Video captured at 352-by-240 can be output at 320-by-240. When capturing directly to MPEG-1 format, you can access all the capture and compression controls described above except for square-pixel output.

Files created in both two-pass and real-time modes passed all of our synchronization and compatibility tests. We compared three files in our jury tests: a real-time file at 352-by-240 and two-pass files at 352-by-240 and 320-by-240. Both two-pass files won the jury tests by a wide margin, drawing the only two ratings of *excellent* in this category. The real-time file also fared well and received a rating of *good.*

Simple and flexible, the Broadway is the straightest line between analog video and MPEG-1 files. When you consider its top ranking in compressed file quality, it's a board that's hard to beat.

Broadway. List price: $995. Data Translation Inc., Marlboro, MA; 800-249-1000, 508-481-3700; fax, 508-624-6782; www.bway.com. *Circle 509 on reader service card.*

DV Studio Apollo2 MPEG-1 and Decoder

DV Studio's Apollo2 MPEG-1 and Decoder ($900 street) provides few frills but delivers stable performance, good MPEG-1 video, and VideoCD development features. The lack of square-pixel output is its most significant shortcoming.

The Apollo2 is based on a chip from Digital Equipment Corp., the DSC21230, which encodes both audio and video. The board includes S-Video and composite video inputs, as well as a stereo audio input and speaker output. In addition to DSmediaVCR—a capture and encoding program—DV Studio includes VideoCD software from CE Quadrat called Win-on-CD 3.0.

The Apollo2's installation went fairly smoothly. But it's the only product in the roundup that changes installation routines depending on the version of DirectDraw that your graphics card runs, and we had to reinstall our graphics drivers to make the products work together.

The basic capture program resembles Media Player, with all options selected from pull-down menus. You name the MPEG file to be captured and select compression modes, input source, and data rate; then you adjust the incoming video for brightness, contrast, hue, and saturation. The Apollo2 outputs solely in 352-by-240 resolution at data rates ranging from 133 KBps to 423 KBps.

You can preview the video during capture, but the product provides no real-time statistics such as frames captured or remaining disk space. Dropped-frame statistics are available after capture, but you have to hunt for them. After capture, you can play the file back from the same interface, using controls similar to Media Player's to navigate through the video.

Though the Apollo2 works in both real-time and two-pass mode, Digital's transcode program produced poor video in two-pass mode. For this reason, we recommend against using the board in that mode.

DV STUDIO APOLLO2 MPEG-1 AND DECODER	
Installation and setup	Good
MPEG-1 encoding quality: real time	Good
MPEG-1 encoding quality: two pass	Poor
Sound synchronization	Excellent
Compatibility	Excellent
Software features	Good
Bundled software	iFilm Edit, DSmediaVCR, Win-on-CD

Although DSmediaVCR generally worked as advertised, its features are limited and often confusing. For example, though it shows square-pixel output as an option, the board doesn't support it and generates an error message when you attempt to compress in that mode. Still, the program lets you save configuration settings, a helpful convenience.

The Apollo2 retained perfect synchronization throughout our 20-minute test tape, and it played back without problems on all the tested players. Videos it created were generally noisy but had good detail and were largely artifact-free, producing relatively good jury scores.

The Apollo2 was stable and produced good output in our tests, and it provides VideoCD capabilities, a big plus for developers producing for that platform. The Apollo2 should be considered for all MPEG compression applications that don't require square-pixel output.

Apollo2 MPEG-1 and Decoder. Street price: $900. DV Studio Inc., Irvine, CA; 800-454-1702, 714-453-1702; fax, 714-453-1311; www.dv-studio.com. *Circle 510 on reader service card.*

LA Vision Snazzi

If MPEG-1 encoding ever becomes mainstream, products like LA Vision's Snazzi will have made it happen. Affordable, at $400 (street), the Snazzi ships with a consumer-friendly interface and a cornucopia of software. The only significant drawbacks are its fair video quality and the lack of 320-by-240 output (which is a more significant issue for title developers than for general consumers).

The Snazzi is built around Digital Equipment Corp.'s DSC21230 MPEG-1 audio/video encoder. The board has S-Video and stereo audio inputs and out-

HOW WE TESTED

MPEG-1 Encoders

We captured all MPEG-1 clips using Micron Millennia PCs, each with a 200-MHz Pentium processor and 32MB of EDO RAM. Each system was equipped with a Diamond Stealth 3D 2000 graphics adapter and the Seagate Cheetah 4LP, a 10,000-rpm hard disk, driven by Adaptec's AHA-2940 Ultra Wide SCSI adapter. The analog source for all tests was Sony Electronics' CVD-1000 Hi-8 deck using S-Video input.

For high-quality jury tests, we used the same 75-second benchmark test clip, capturing and encoding at a video rate **of 1.15 MBps and an audio rate of 96 KBps. In addition, we tested audio/video synchronization by capturing a 20-minute talking-head sequence and playing back the clip to ensure that synchronization was maintained. We checked playback compatibility by playing back each clip on Sigma Designs' REALmagic Ultra MPEG-1 and on ActiveMovie, CompCore, Mediamatic, and Xing players. All boards passed both synchronization and compatibility tests without any problem.**

ATI XPERT@Work puts the future firmly in your grasp.

ATI XPERT@Work is the NEW standard for Windows NT and Windows 95 graphics performance.

Professional Productivity

- Fastest performance for greater productivity in Windows NT and Windows 95
- Eliminate eye-strain with flicker-free images at up to 200Hz refresh rates
- Up to 8MB of ultra fast SGRAM for high resolution and true color acceleration

Leading Edge Support Now...

- Optimized for the best performance on Pentium II / PRO systems
- Rock-solid stability and worry-free compatibility with ATI's Microsoft Certified drivers

And for the Future

- With workstation-class 3D hardware that's DVD-ready, ATI protects your reinvestment into the future

Starting at $179[2]

Check out www.atitech.com or call (905) 882-2600

© Copyright 1997 ATI Technologies Inc. ATI, XPERT @ Work, 3D Rage Pro, ATI-TV and Now You See It are trademarks and/or registered trademarks of ATI Technologies Inc. All other product names are trademarks and/or registered trademarks of their respective owners. Features, performance and specifications may vary by operating environment and are subject to change without notice. Products may not be exactly as shown. [1] ATI driver used in a Microsoft Certification Candidate 2D WinBench 97, Business Graphics Test at 1024x768x16bpp, 75Hz, run on an Intel Pentium II 266MHz, 512K cache, 32MB SDRAM, PCI bus, NT 4.0. Hardware and software driver versions used: ATI XPERT@Work 4MB SGRAM driver release v4.10, Matrox Millennium 4MB WRAM v2.3 driver release v5.06, Diamond Multimedia Stealth 3D 3000 4MB VRAM v1.01 driver release v2.05. [2] Suggested retail price for 2MB upgradeable version.

CIRCLE 059 ON READER SERVICE CARD
OR GO TO WWW.PCMAG.COM/ProductLink

Now You See It.™

puts, enabling you to play MPEG-1 files on an NTSC monitor or television. LA Vision includes a composite–to–S-Video converter for cameras or decks without S-Video output.

The Snazzi's application interface, Amigo, is an easy-to-use program built around a capture-and-playback window. It works in three modes: Camera, for still-image grabs; Recorder, for real-time MPEG-1 encoding; and Player, for playing back MPEG-1 videos.

In Camera mode, the Snazzi captures still images ranging from 160 by 120 pixels to 1,600 by 1,200 pixels, storing them in TIFF, TARGA, .BMP, JPEG, or .PCX format. In Recorder mode, it can capture real-time MPEG-1 files in 352-by-240 and 176-by-120 resolutions, at data rates ranging from 33 KBps to 550 KBps. Square-pixel 320-by-240 output is not available. You can adjust brightness, contrast, saturation, and tint for both still image and video captures.

In Player mode, the Snazzi provides a slider bar beneath the playback window. But controls such as Play, Stop, and Pause are awkwardly located on the right-hand panel rather than next to the slider. After playing back videos, Amigo provides statistics such as number of frames dropped and playback display rate.

We tested only real-time capture (the Snazzi is not capable of two-pass operation). In that mode, the Snazzi passed all of our synchronization and compatibility tests. But our jury found that its MPEG files were exceptionally noisy and showed poor color fidelity, with spurious fluorescent hues appearing in flat-colored areas such as those depicting walls or water. This problem placed the Snazzi near the bottom in our hardware comparisons, with a rating of only *fair*.

Balancing these mediocre results is an attractive selection of bundled software. Programs such as Win-on-CD (for VideoCD applications development and CD recording), Cinax Designs' iFilmEdit (for MPEG-1 cut-and-paste editing), and MediaStudio Pro 2.5 (for video editing) should prove valuable to many users.

Title developers and corporations should probably look elsewhere, because of the Snazzi's lack of square-pixel output and average video. But consumers looking for an easy, inexpensive way to convert videotapes to MPEG-1 format will find the Snazzi appealing.

Snazzi. Street price: $400. LA Vision Inc., Hayward, CA; 888-436-4348, 510-476-1300; fax, 510-476-1313; www.la-vision.com. *Circle 511 on reader service card.*

Optibase MPEG ShowSite

Optibase's MPEG ShowSite ($2,000 street) has an excellent software feature set but fair output quality. It's also the only MPEG encoder board in the roundup that requires an external NTSC monitor or the equivalent, a factor that adds to the cost of your system. Unless your primary goal is output in NET TOOB, an MPEG-1–based streaming video format, you'll be better off with a different encoder.

Powered by a C-Cube CL4020 VideoRISC Processor and a Chrystal DSP, the ShowSite is a real-time audio and video MPEG-1 encoder with S-Video, composite video, and stereo inputs, stereo output, and a composite-out port for real-time preview of the encoded video. You need the external NTSC monitor because the ShowSite doesn't display video on a computer monitor.

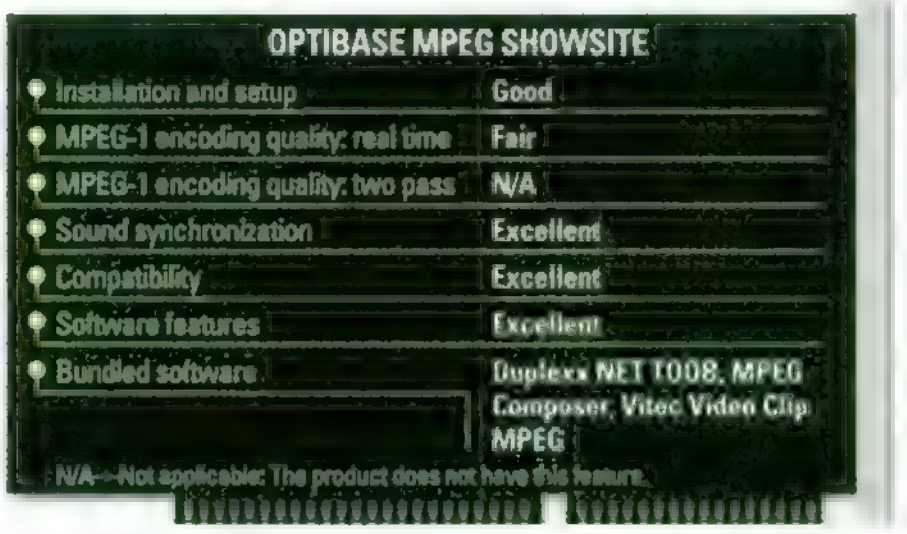
The ShowSite's control software, MPEG Composer, runs under Windows 95 or Windows NT and provides a wealth of useful options. It runs in two modes. In Detailed mode, you select all configuration and output options. In Preset mode, you choose among 12 output presets and identify movie content; the board does the rest. Both modes let you output MPEG audio (MPA), video (MPV), and system streams (MPG), as well as VideoCD files, SIF and QSIF files, and NET TOOB files.

In either mode, target data rates range from 3 KBps to 625 KBps at SIF (352-by-240) or QSIF (176-by-112) resolution. The ShowSite does not support 320-by-240 output. Frame rates can scale down to 5 frames per second, useful for streaming files.

You can modify the incoming video's hue, saturation, brightness, and contrast, and you can adjust horizontal and vertical offset, eliminating black lines from the video edges. The ShowSite offers video filtering on both horizontal and vertical axes and automatically applies it in Preset mode; you control the filtering in Detailed mode. You can also adjust audio volume from within the same interface.

Although the program worked well in our testing, it had some irritating characteristics. For example, although we could adjust video settings during preview, we couldn't hear the audio until encoding started, so we couldn't adjust it. Most significant was the disparity between the colors shown on the NTSC monitor and those actually captured. This problem made capture a trial-and-error process.

The ShowSite sailed through the 20-minute synchronization test and all playback compatibility tests, but it fared worse on the jury tests, producing noisy video that frequently displayed artifacts such as mosquitoes, blockiness, and periodic color shifts. The board ranked at the bottom of our quality jury tests.



Cheaper boards produce better video quality, so the ShowSite's main advantage is in enabling NET TOOB output for Internet distribution. If you don't find that feature compelling, you won't find the ShowSite a showstopper.

MPEG ShowSite. Street price: $2,000. Optibase, San Jose, CA; 800-451-5101, 408-260-6760; fax, 408-244-0545; www.optibase.com. *Circle 512 on reader service card.*

Introducing the new Toshiba Tecra. The ultimate portable for corporate America.

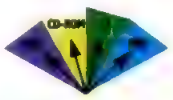
If there's one thing we know how to do well, it's raising portable industry standards to new levels. Something we couldn't do without the constant challenge of not only meeting your needs, but surpassing them. Introducing the Tecra™ 530CDT. A portable packed with the perfect balance of performance, portability and expandability. Delivering a high-resolution TFT display, large storage capacity and a 166MHz Intel Pentium® processor with MMX™ technology. All wrapped up in a sleek new design. The Tecra 530CDT. Experience the portable that will take the business world into the next millennium. When you do, you'll find yourself in a place where staying ahead of the game is a way of life. With one clear intention. **Always Lead.™**

Tecra 530CDT/520CDT

- 12.1" dia. active-matrix TFT color display
- 1024 x 768 resolution (530CDT)
- 800 x 600 resolution (520CDT)
- 166MHz Pentium® processor with MMX™ technology. 256KB L2 cache
- 2.1 billion byte (=2.02GB) removable HDD
- 32MB high-speed EDO DRAM (expandable to 160MB)
- PCI system-bus architecture
- SelectBay™ supports CD-ROM, floppy disk drive, optional second hard drive or optional second Lithium Ion battery
- Modular 10X* CD-ROM
- HiGVideo™ PCI graphics controller with 2MB video memory (4Mbit EDO RAM)
- Universal Serial Bus (USB) port
- MPEG playback through either software or optional ZV Card
- 16-bit MIDI, WAV and Sound Blaster® Pro compatible with stereo speakers and microphone
- Supports two Type II or one Type III 16-bit PC Cards, ZV Cards or 32-bit CardBus Cards
- Built-in cellular-ready 33.6Kbps, V.34 voice/data/fax modem
- Fast Infrared (FIR) IrDA compliant port
- Lithium Ion battery
- Optional Desk Station V Plus docking station or NoteDock™ II Enhanced Port Replicator
- Windows® 95
- 3-year limited warranty
- Toll-free technical support - 7 days a week, 24 hours a day

For more information, visit http://computers.toshiba.com, or call 1-800-457-7777.

In Touch with Tomorrow
TOSHIBA



CUSTOMIZED CONFIGURATION
With the SelectBay,™ configure your system to meet your needs. Swap out your 10X* CD-ROM with a floppy disk drive, optional second 2GB hard drive or optional second Lithium Ion battery

MMX intel inside pentium® processor

ULTIMATE PERFORMANCE
Experience accelerated multimedia applications with MMX™ technology, 32-bit PCI architecture and 32MB of memory, standard

EXPANDABILITY
With our one-touch hot docking solution, you get additional slots for PC Cards, PCI and ISA Cards and stereo speakers

©1997 Toshiba America Information Systems, Inc. All specifications and availability are subject to change. *10X average speed. All products indicated by trademark symbols are trademarked and/or registered by their respective companies. Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation.

CIRCLE 378 ON READER SERVICE CARD

FIREWIRE BOARDS

FireWire capture boards represent the next wave, one that will drop the cost of professional-quality video production to under $5,000. But FireWire is merely a transfer mechanism, a conduit from the camera to your PC. The hero behind the FireWire story is the DV (digital video) format, with which this discussion must begin.

Briefly, DV is a digital video format used by a new breed of cameras that is rapidly replacing Hi-8 and S-VHS formats at the low and middle segments of the video production market. These cameras have internal circuitry that acts like a capture board, digitizing the lens input, compressing it to DV format, and storing it on a small tape (for more on these cameras, see the sidebar "Seeing Digital").

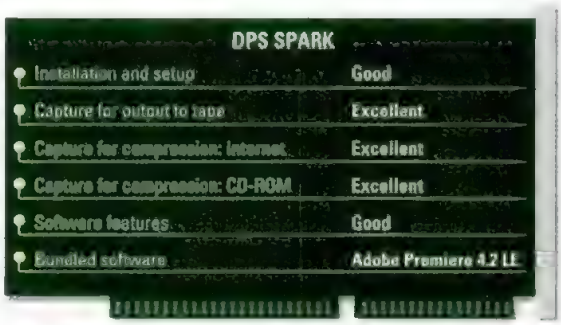
When capturing from DV cameras, you don't need to digitize, since the video is already in a digital format. Instead, you perform a file transfer from camera to computer. This requires a physical connection between the devices for the kind of throughput demanded by video files. The link is accomplished via an IEEE 1394 (FireWire) connector on the camera and a board installed in your computer.

A FIRE IS STARTED

After months of hype, the first FireWire capture boards have finally hit the streets. Digital Processing Systems' Spark ($995 list) and miro Computer Products' miroVideo DV 100 ($600 street) were released just in time for this feature. FAST Electronics also offers a FireWire solution, the DV Master ($3,995 list), but the company declined to provide a unit for testing.

All three products work like traditional capture boards, except that they use a FireWire connection between the video source device and the PC system, rather than an S-Video connection. All the boards capture .AVI files that can be edited with tools such as Adobe Premiere. But they carry the same ball and chain as traditional boards: the 2GB .AVI file-size limitation.

After editing, you can compress the video for distribution digitally or render it in DV format for transfer back to the camera through the FireWire port. From there, developers distributing in analog formats such as VHS can dub to these formats using traditional S-Video connectors.



CHOOSING A FIREWIRE BOARD

In purchasing a FireWire board, the first consideration is capture quality. Though all boards receive the exact same file from the camera, each uses a different decoder to decompress (from the DV camera's native compressed format) and display the video. We saw a dramatic difference between the two boards in output tonal quality.

Second is the ability to reencode to DV format for transfer back to the camera. The quality of the rendered output is a key issue here. Currently, the DV 100 can't encode to DV format. This means you must have another capture board, such as the miro DC30 *plus*, in order to create video for analog distribution.

Rendering speed is also important. The Spark encodes with a software-based codec that produced awesome-quality video, but it did so very slowly. Cards with dedicated on-board encoder chips should be faster but will obviously cost more.

The third consideration is machine control, or the ability to control the source deck from the computer. Machine control is a good option for all types of capture cards, but it should be common in FireWire boards, because all DV decks use the same protocol and communicate over the FireWire connection, simplifying implementation.

Deck control also provides a simple way around the 2GB .AVI file-size limitation. Producers can build and render videos of any length, 2GB at a time, stitching them together with frame accuracy. Though not optimal, this approach gets the job done—at least until more elegant solutions arrive. Other considerations include the bundled editing software, time-line responsiveness, and stability. These issues are addressed in our product reviews.

Neither of the boards we tested offers a perfect solution yet. The Spark doesn't have machine control, and the DV 100 lacks DV encoding and, on our tests, had trouble with faithful color reproduction. Of course, these glitches come as no great surprise, since this market is just beginning to emerge. For these reasons, we've opted not to designate an Editors' Choice in the FireWire category. But the good news is that if you have a digital camera, you can begin capturing and editing digital video on your desktop today.

DPS Spark

Digital Processing Systems' capture board may offer the spark needed to ignite the desktop digital-video-editing market. The Spark ($995 list) flawlessly captures, edits,

HOW WE TESTED

FireWire Boards

We installed both FireWire boards in our Micron Millennia Pentium/200 test-beds with 32MB of EDO RAM, running Windows 95 for the miroVideo DV 100 and Windows NT 4.0 for Digital Processing Systems' Spark. We captured all videos from the Sony DSR-200 camcorder via the FireWire port.

To test capacity, we captured a 9-minute test clip with both boards. For jury testing, we captured four segments totaling roughly 1 minute outputting from the respective editors in raw .AVI format and compressing to MPEG-1 and RealVideo.

To test the Spark's ability to output DV format, we encoded the 1-minute jury test clip to DV format and transferred both the 1-minute and 9-minute clips back to the DSR-200. The DV 100 couldn't output to DV format.

and renders DV-encoded video.

The Spark is a PCI-bus board, using Adaptec's 8940 FireWire board and shipping with a proprietary capture utility and Adobe Premiere, Version 4.2. It's also available without Premiere for $699 (list). Capture and rendering to the DV source occurs in DPS's utility. You capture with simple VCR-like controls using an NTSC monitor to queue up the video, since there is no on-screen preview. Unfortunately, DPS's capture utility does not support machine control for manipulating the source deck from the software. After capture, you can play the video in a small window on your computer monitor or view it on your NTSC monitor.

Editing was reasonably responsive, with captured test clips appearing in both the clip window and the time line. This let us work from our computer monitor rather than the NTSC source. But rendering and previewing were extremely slow. We couldn't compare preview times with those of the miroVideo DV 100 (which doesn't encode to DV format). But comparisons with typical Motion-JPEG cards are instructive. It took the Spark 4 minutes 29 seconds to preview a 3-second cross-dissolve; the miro DC30 *plus* took 45 seconds to accomplish the same task. It took the Spark three times as long as the DV 100 to render a raw 320-by-240 file (75 minutes total).

On the other hand, the Spark's video quality was clearly superior to the DV 100, particularly in the reproduction of skin tones. The DV 100 produced greenish tints. The Spark's MPEG-1 test file was virtually free of artifacts and background noise, and the RealVideo clip was clearer than that produced by other capture cards.

In rendering to DV format, the Spark was spectacular. It produced exceptionally high-quality video with just a hint of artifacting around a slowly expanding title—a Motion-JPEG torture test. Slow dissolve transitions were completely clear of artifacts.

Completing the circle, the Spark transferred the rendered 1-minute clip and a 9-minute (2GB) test clip to the Sony DSR-200 digital video camera without difficulty. The DSR-200's stunning video quality would have accentuated any compression artifacts in the Spark's rendered clips. Instead, the Spark's video passed with flying colors.

The Spark is an invaluable component of a desktop editing suite. With machine control and a mechanism to avoid the 2GB .AVI file-size limitation, both of which DPS promises by the end of this year, the Spark could become your entire editing suite.

Spark. List price: $699; with Adobe Premiere, Version 4.2, $995. Digital Processing Systems Inc., Markham, Ontario, Canada; 905-944-4000; fax, 905-944-4200; www.dps.com. *Circle 505 on reader service card.*

miroVideo DV 100

A speedy performer with some interesting features, miro Computer Products' miroVideo DV 100 ($600 street) is marred by some significant flaws, including the lack of DV encoding capabilities. The DV 100 also slightly distorted the color balance of the acquired DV image. Until miro resolves these issues, you're probably better

IBM Business Partner

Waist: 34. Inseam: 52.

The solution is here. One size does not fit all. Looking for a solution tailored just for your business? Look no further than IBM Business Partners – independent experts who can outfit you with the right mix of technology, support, price and financing. For one who specializes in your line of business, call 1 888 IBM-2992, ext. 9999.

The IBM logo is a registered trademark and the IBM Business Partner emblem is a trademark of International Business Machines Corporation and are used together under license. © 1997 IBM Corp. All rights reserved

MIROVIDEO DV 100	
Installation and setup	Good
Capture for output to tape	N/A
Capture for compression: Internet	Fair
Capture for compression: CD-ROM	Fair
Software features	Good
Bundled software	Adobe Premiere 4.2 LE

N/A—Not applicable: The product does not have this feature.

off with another DV FireWire product.

The DV 100 uses the Texas Instruments 6235307 chip and ships with StoryTools, a capture and storyboard program, and Adobe Premiere 4.2 LE. miroVideo StoryTools has some innovative storyboard-related features, but its capture tools are nearly lost in the shuffle.

StoryTool's strongest capture-related feature is machine control, letting you use program controls to start, stop, and rewind to specific video frames, mark in and out points, and then acquire the target segments. Like the Spark, the DV 100 offers no on-screen preview of the video, and you have to use an NTSC monitor to choose your in and out points.

In the current release, the DV 100 can't reencode video back to DV format or transfer the DV-encoded file back to the deck or camera. The DV 200, slated for release before the end of this year, will be able to reencode and upload video. It will also include an enhanced version of StoryTools. Until then, miro recommends buying the DC30 *plus* if your goal is to output video to analog format. Since the DC30 *plus* uses a different Motion-JPEG encoder, it introduces an additional layer of compression artifacting, however slight. And this adds another $995 to the cost of your digital-video-editing system.

The DV 100 didn't encode back to DV format, so comparing its time-line performance and rendering speeds with the Spark's would not be relevant. But the DV 100 was clearly a faster decoder than the Spark, creating a raw 320-by-240 file for MPEG-1 encoding in 25 minutes—compared with the Spark's 75 minutes. We had to create the DV 100's test clip in two parts to avoid repeated out-of-memory error messages in Adobe Premiere.

Working from the same DV source as the Spark, the DV 100 produced video that was slightly greenish in tint, a flaw that was most evident in facial tones but manifested as less brilliant colors in all other scenes. This didn't affect compressed video quality. Notwithstanding color, the DV 100's MPEG-1 and RealVideo test clips were about on a par with the Spark's.

In general, the lack of DV encoding capabilities give the DV 100 an unfinished feel, but machine control and miro's proven ability to work around the 2GB file-size limitation make the product's future very bright, assuming its color problems can be corrected.

miroVideo DV 100. Street price: $600. miro Computer Products Inc., Palo Alto, CA; 800-249-6476, 415-855-0955; fax, 415-855-9004; www.miro.com. *Circle 506 on reader service card.* PC

CIRCLE 006 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

SAMSUNG
monitors

simply perfect vision™

b series monitors
for business users
SyncMaster™ 500b • SyncMaster 700b

superior image
1280 x 1024* resolution, completely flicker-free, edge to edge viewing. anti-reflective UltraClear™ screen coating

Display Director™
advanced digital on-screen control system, full color menus, one-button control, color adjustment

call 1 800 933 4110
for the dealer nearest you or visit our web site at www.sosimple.com

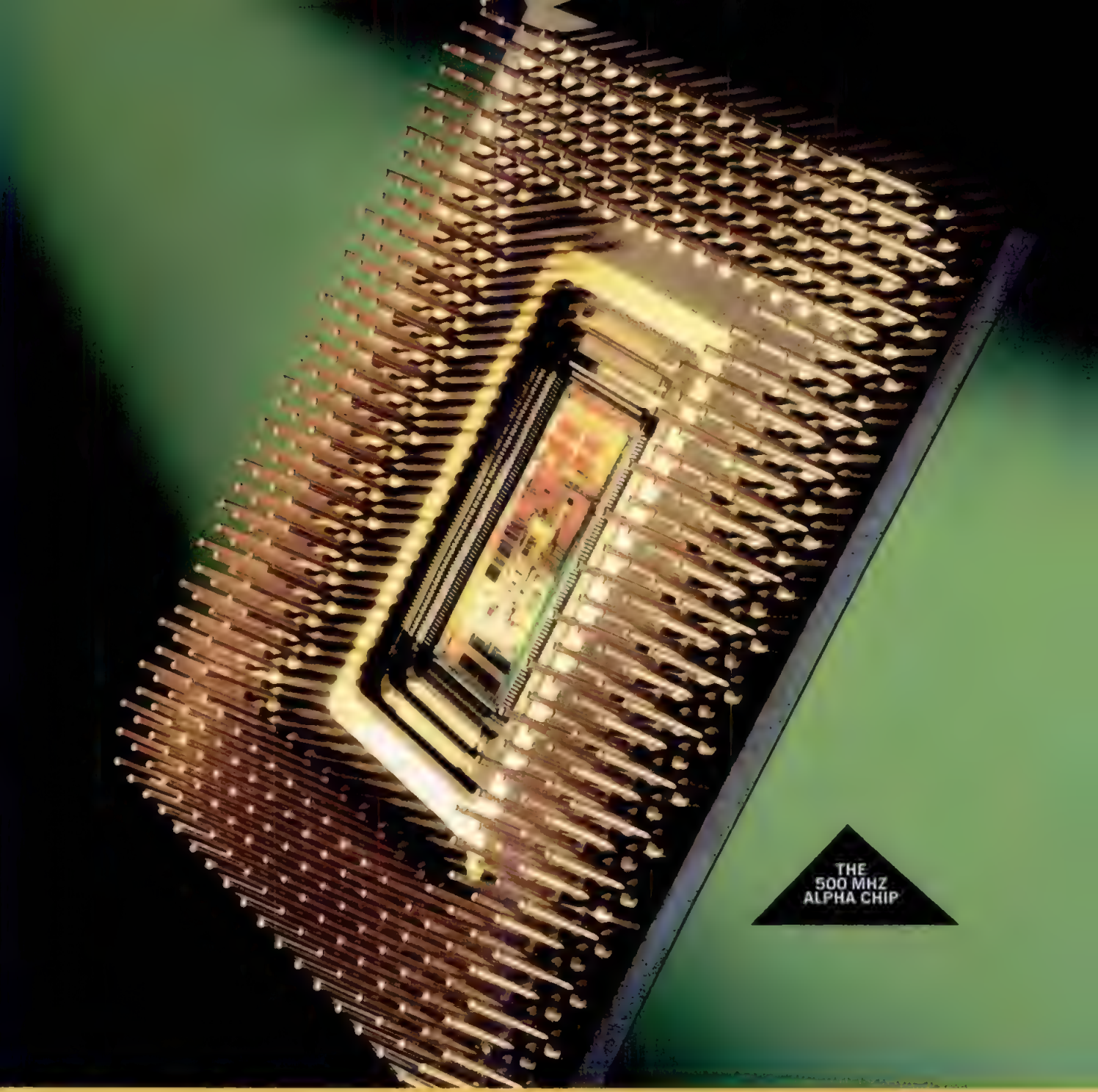
simply samsung

3 Year Warranty · 24 hour Support · Advanced Replacement Program · Sept 1995 PC Week Labs Choice · Feb 1996 · Sept 1996 Editors' Choice · June 1996 · July 1996 · Aug 1996 · Summer 1996 · Partner of the Year 1996, 1997 · 1996 VAR Business Product Award Winner · Jan 1997

*COMPLETELY FLICKER-FREE AT 1024 x 768 AT 89Hz. ©1997 SAMSUNG ELECTRONICS AMERICA, INC. SIMPLY PERFECT VISION AND SYNCMASTER ARE TRADEMARKS OF SAMSUNG ELECTRONICS AMERICA, INC. THE *TRADEMARK SIMPLY PERFECT™ IS NOT A LITERAL DESCRIPTION OF THE PRODUCT. ALL OTHER BRANDS AND PRODUCT NAMES ARE TRADEMARKS OR REGISTERED TRADEMARKS OF THEIR RESPECTIVE COMPANIES

CIRCLE 033 ON READER SERVICE CARD

AT 500 MHZ,
WHIPLASH
BECOMES A
VERY REAL
POSSIBILITY.



The breakneck speed of a PC powered by an Alpha processor may take some getting used to. But you'll grow to love running your Windows NT® software on the world's fastest microprocessor. Alpha PCs run your favorite Windows® software too. And they're available, at competitive prices, from a variety of manufacturers right now. So hang on tight—and call (888) ALPHA-45 for details. Or visit www.alphapowered.com.

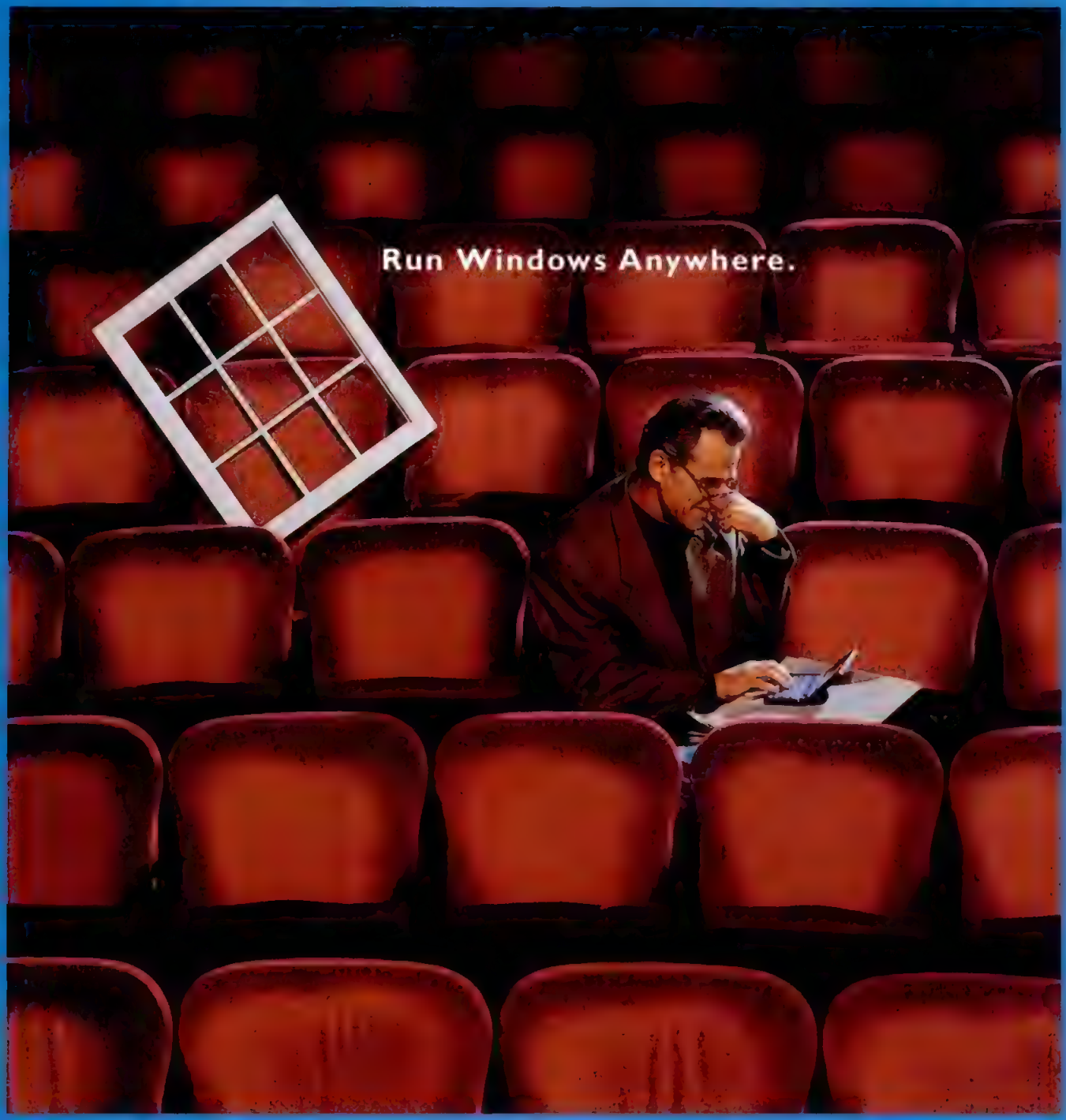
MICROSOFT WINDOWS NT COMPATIBLE

© 1997 Digital Equipment Corporation. DIGITAL, the DIGITAL logo and AlphaPowered are trademarks of Digital Equipment Corp. Mitsubishi is a registered trademark of Mitsubishi Electric Corp. Samsung is a trademark of Samsung Electronics Co. Windows and Windows NT are registered trademarks of Microsoft Corp.

digital™ MITSUBISHI SAMSUNG

Alpha processors are made by these leading technology companies.

AlphaPowered



With the Velo handheld PC, carrying your work around has never been easier. It runs Microsoft Windows CE and pocket versions of Word, Excel and Internet Explorer. And with its built-in modem, you have everything you need to access e-mail, send faxes and surf the Web. Now you can work just the way you work on your office PC, no matter where you happen to be.

For more details on the product that's won awards from PC Magazine and Byte magazine, call 1-888-FOR-VELO or visit our Web site at www.velo1.com.

Let's make things better.

PHILIPS MAGNAVOX

© 1997 Philips Electronics North America Corporation. Velo is a registered trademark of Philips Electronics. All other names are either registered trademarks or trademarks of their respective owners.

CIRCLE 220 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Desktop Video-Conferencing

The first affordable desktop videoconferencing kits are here. But do they live up to the promise of H.324?

By Don Labriola

Maybe we can blame "The Jetsons" for helping to set our expectations too high, but desktop videoconferencing products have always been a disappointment. Though the technology is anything but new—the first desktop videoconferencing systems ran over 128-Kbps ISDN lines back in the early 1990's—the day when telephones will be supplanted by videophones capable of delivering TV-quality, 30-fps video is still as far off as the robot maid.

There is a glimmer of hope, though. Two standards drawn up by the ITU (International Telecommunications Union), H.323 and H.324, have given rise to the first generation of consumer-targeted videoconferencing upgrade kits that communicate over POTS (plain old telephone service) lines.

But don't get too excited. The H.324 standard allows for significant improvement in video quality, frame rate, and interoperability. Our assessment, however, is that the new products will need myriad improvements before they live up to the standard.

Many of these products are difficult to set up. Few offer true interoperability, which means that the same product must be used on both ends of the connection. They require V.80-class modems (newer V.34 modems and most 56-Kbps products are V.80-capable) and work best on powerful MMX systems with 150-MHz or faster processors. Anything less will produce video that's sluggish and jittery—something akin to an Impressionist painting. Even with a powerful machine, if you expect smooth audio and video, you're in for a letdown.

Perhaps the best thing about the new breed is price. A POTS upgrade kit generally sells

www.pcmag.com

Join frequent contributors Ted Needleman and Don Labriola and associate editor Toni Kistner online for a discussion of **Desktop Videoconferencing.**

PHOTOGRAPHY BY MERT KERIM AND THOM O'CONNOR

IN THIS REVIEW

Boca Video Phone Kit 222
Diamond Supra Video Phone Kit 3000 226
Gallant InterVision Pro 227
Panasonic EggCam GP-KR0011 229
Tekram How-R-U Video Conferencing Kit 231
3Com Bigpicture Video Kit 1622 231
Editors' Choice 221
H.323: Videophones on the Net 226
Summary of Features 229

Glossary

CODEC (COder/DECoder) Any hardware or software mechanism that translates video or audio streams between an analog signal and a compressed digital format.

HOPS (HOst Proximity Service) A proposed Internet routing mechanism designed to improve performance by ensuring that videoconferencing traffic is always directed to the nearest available server.

H.320 A suite of standards for videoconferencing over digital switched media such as ISDN, Switched 56, and T1 lines. It includes the H.261 video codec and the G.711, G.722, and G.728 audio codecs.

H.323 A suite of standards designed for videoconferencing over packet-switched networks such as the Internet and Ethernet. H.323 also defines the H.263 video codec and the G.723.1 audio codec and incorporates the IETF's RTP standard

H.324 A suite of standards designed for videoconferencing over analog phone lines and V.34 modems. The specifications define the V.80 modem protocol, which enables V.34 modems to manage synchronous audio/video data streams more efficiently.

INTERNATIONAL MULTIMEDIA TELECONFERENCING CONSORTIUM (IMTC) A videoconferencing industry organization that helps define requirements for international standards.

INTERNATIONAL TELECOMMUNICATIONS UNION (ITU) A branch of the United Nations that coordinates and standardizes telecommunications technologies.

INTERNET ENGINEERING TASK FORCE (IETF) A consortium of engineers, users, vendors, and researchers that develops Internet standards. It promotes standards such as RTP, RSVP, and HOPS in an effort to make the Internet more hospitable for time-sensitive multimedia traffic.

MULTIPOINT TELECONFERENCE Any audio, video, or data conference that links more than two sites. H.323 and T.120 have built-in multipoint capabilities, but H.324 and H.320 require an external device called a multipoint control unit to conduct multipoint sessions.

RSVP (ReSource reserVation Protocol) A router specification that lets videophone users reserve bandwidth over an intranet or Internet connection, thus reducing bandwidth fluctuations.

for $200 to $400, depending on whether it includes a modem. The low cost makes for a fairly good fit with the PC-savvy consumer market. Out-of-state grandparents who rely on photos and phone calls between visits might find a videophone a good way to watch their grandchildren grow—assuming a technically literate person can set up the system.

The price might even lure corporate users to take a second look. If you regularly consult with an off-site colleague, for instance, you both might appreciate a one-on-one videoconference. Most kits include data-conferencing software, which lets you work jointly on graphics or text, or even share third-party applications.

DEFINING A CATEGORY

PC Magazine Labs evaluated the first six available H.324 POTS videophone add-on kits: the Boca Video Phone Kit, the Diamond Supra Video Phone Kit 3000, the Gallant InterVision Pro, the Panasonic EggCam GP-KR0011, the Tekram How-R-U Video Conferencing Kit, and the 3Com Bigpicture Video Kit 1622. Each includes a camera, capture board, and software; list prices range from $199 to $399.

We also reviewed Intel's Video Phone software, which comes bundled with PCs from Compaq, NEC, Toshiba, and other vendors.

H.324 POTS products that didn't ship in time for testing include the Aztec Video Phone Upgrade Kit (PCI), the Best Data Smart One Personal Videoconferencing Kit, the Philips *Easy*CAM, and the Winnov Videum Conference Pro. (For more details, see this issue's Trends/Networking section.)

A STALLED TECHNOLOGY

Until now, desktop videoconferencing systems were geared to Fortune 500 companies. Most ran over costly ISDN lines, were difficult to set up, and cost between $1,000 and $2,000.

H.324POTS videoconferencing kits are poised to hit the marketplace.

Comparably priced network and POTS-based systems have been around for about three years. LAN-based products sometimes provided video quality superior to that seen over ISDN connections, but they required an unrealistic amount of bandwidth. Desktop POTS solutions were even less attractive, producing video streams better measured in frames per *minute*, with little or no interoperability.

CLOSER, BUT NO CIGAR

The H.324 standard holds promise. Surprisingly, this first crop of products fails to take optimal advantage of it. The spec allows for interoperability, but only two of those we tested—the Gallant InterVision Pro and the 3Com Bigpicture Video Kit 1622—had this capability.

The standard also improves video quality via the H.263 codec algorithm, which provides efficient video compression and decompression over analog connections. Unlike earlier ITU codecs, H.263 is fast enough to manage 15-fps video streams without requiring an expensive add-in board. These products produce streams in the 8- to 15-fps range—acceptable but a far cry from television-quality video.

H.324 further improves performance by defining the V.80 modem protocol, which switches V.34 modems into a video-friendly synchronous mode and shuts off high-overhead V.42 error correction. Our testing revealed that some modems didn't work with every combination of system hardware and videophone software. Particularly touchy were 56-Kbps units, which we ran at 33.6 Kbps.

Despite their shortcomings, H.324 POTS videoconferencing solutions are poised to hit the marketplace. This year, Intel began providing videoconferencing kits to PC vendors. Of course, to be seen by the person on the other end, you'll have to purchase a video camera.

TV-based videoconferencing solutions

Our Contributors: DON LABRIOLA and TED NEEDLEMAN are frequent contributors to *PC Magazine*. TONI F. KISTNER is the associate editor for networking and communications. Senior editor LEON ERLANGER was the editor in charge of this story, and JEFFREY G. WITT was the project leader.

are another possibility. The first to ship is the ViaTV Phone VC100 from 8x8 Inc. (For a full review, see the sidebar "Even Grandma Can Do It.") Though such products carry list prices of about $500, they offer good video quality and are extremely easy to set up and use.

For videoconferencing over packet-switched networks such as the Internet, intranets, and Ethernet LANs, the H.323 standard is expected to provide comparable benefits. (To see how well the first H.323 products live up to the standards, see the sidebar "H.323: Videophones on the Net.")

Editors' Choice

- Not ready for prime time

Although the H.324 standard calls for significant improvements in video quality, frame rate, and interoperability over previous analog videoconferencing products, none of the first H.324 POTS kits lived up to our expectations. They require V.80 modems and for best results should be installed only on PCs with MMX-capable, 150-MHz CPUs or better, with good sound equipment. They are difficult to set up, exhibiting numerous conflicts with SCSI adapters, modems, and video adapters. Video and audio quality are unimpressive as well. Frame rates of 8 to 15 fps won't let you do more than look at a blurry face at the other end of the connection.

Despite this gloomy analysis, these products' low prices ensure that they'll have an effect on the market. Even so, it may be wiser to buy a new PC outfitted with Intel's Video Phone software. If that's not an option, two of the PC-based kits, as well as the TV-based kit we tested, deserve honorable mentions.

The Diamond Supra Video Phone Kit 3000 and the 3Com Bigpicture Video Kit 1622 impressed us with smooth setups. Each kit includes a V.80 modem; the 3Com modem is upgradable to 56 Kbps. Each kit includes a Philips Color Camera and a comprehensive software package. The 3Com unit delivers better interoperability than the Supra, but as long as you use the same product on each end of the call, you'll get pretty good results.

If you hope to videoconference with long-distance relatives who may not have a computer, the ViaTV Phone VC100 from 8x8 is an excellent solution. Though priced at around $500 list, it is extremely easy to set up and use.

IT'S ALL IN THE BOX

The kits include all you need to get up and running: a video capture board, color camera, and software. Two products—the Diamond Supra Video Phone Kit 3000 and the 3Com Bigpicture Video Kit 1622—also include V.80 modems. For the best results, consider upgrading your speakers and adding a microphone.

The kits' components vary, but the results are comparable. All the boards we tested let you capture both still and motion video except the Boca, which only captures motion video. We liked the Philips Color Camera for its profusion of on-board controls; however, most features, such as contrast, focus, and light compensation, can also be adjusted via software.

Audio quality was similar among the products: arguably adequate, comparable to that of a cheap speakerphone. Most cameras contain a built-in microphone, but you might consider a lapel mike for particularly noisy surroundings.

All kits supply third-party H.324 videophone software. The most popular (and similar) programs are Smith Micro's VideoLink and VDOnet's VDOPhone Professional. Each stresses ease of use and provides picture-tuning controls, diagnostic tools, and telephony functions. Once you connect, the software lets you adjust frame rate, brightness, contrast, and sharpness. Most kits also include proprietary Internet videophone capabilities, and they are expected to add H.323 compliance by the time you read this.

HOW WE TESTED

We ran each product through a standard installation procedure, noting any hardware incompatibilities or special system constraints. We evaluated video quality during a POTS session between identical units, and tested interoperability by connecting the products to each other, round-robin style. To test how well the products communicate with a PC equipped with Intel's videoconferencing product, we set up the units to communicate with a reference Intel Video Phone installed on a custom Pentium II system. Video stability, ease of installation, and ease of use were also key evaluation criteria.

Our test-beds were Hewlett-Packard Vectra UX 5/90C desktop units. Each used an Intel 150-MHz MMX OverDrive processor, 32MB of RAM, a Creative Labs Sound Blaster AWE64 Gold sound board, and an 8MB Number Nine Imagine 128 II graphics adapter (or a 2MB Matrox Millennium MGA-MIU2N if the product couldn't run the Number Nine adapter), and a variety of speakers and microphones. For those kits that didn't include a modem, we used a Motorola ModemSurfr 56-Kbps external model, except in the case of the Panasonic EggCam, which required a 3Com Video Modem.

HOW THEY STACK UP

A few of these plug-and-play products installed easily (the Diamond and 3Com units) but most had conflicts with modems, motherboards, or graphics adapters.

Despite the H.324 standard, interoperability was startlingly poor. The only models that produced acceptable results were the Bigpicture 1622, which worked with the Boca, Gallant, and Tekram kits, and the InterVision Pro, which connected successfully to the Diamond, Panasonic, Tekram, and 3Com units.

Picture quality was what you'd expect at 8 to 15 fps, varying little across the products. Processor speed—not components or software—turned out to be the most significant factor. When reading the following reviews, remember that ease of setup and use, price, and interoperability are the most important criteria to consider.

Intel Video Phone: Does It Steal the Show?

By Ted Needleman

Although our testing proved that software applications dictate how well these products work, nearly every vendor packages the same third-party software, either from VDOnet Corp. or Smith Micro Software.

Intel has approached videoconferencing from a completely different angle. Rather than offering an upgrade kit, Intel developed Video Phone software, available only as a preinstalled application bundled with "videoconferencing-ready" PCs. Different PC vendors bundle different versions and flavors of the product.

The software supports both the H.324 and the H.323 standards. Versions 1.0 and 2.0, however, can come equipped with either "receive video only" (and two-way audio) capability, or with full video and audio bidirectional capability. Version 2.0 is a marked improvement over Version 1.0 because it provides an icon-based graphical interface and takes advantage of MMX technology for improved performance. Only HP and Toshiba include version 2.0 on their systems so far.

Most PC vendors bundle the "receive video only" version of the software. For bidirectional conferencing, you need to purchase an upgrade kit from Intel. Two are available: a $199 (list) product with a Universal Serial Bus (USB) camera, and a $399 (list) kit with a non-USB camera and Intel's Smart Video Recorder III capture board. Each bundles Video Phone 2.0.

A BETTER WAY

We tested Video Phone 2.0 in the H.324 point-to-point mode using an Intel-supplied system with a standard Tucson motherboard, a 266-MHz P55c MMX CPU, a Datatran modem, an Intel Smart Video Recorder III for video capture, and an Intel-brand camera.

Video Phone 2.0 features an attractive screen that displays the caller window near the top and a self-view window below. On-screen icons let you adjust audio volume, enlarge the video display, or switch to full-screen mode (in which case your self-view window appears as a small picture in a picture). Features include a whiteboard that appears on the screen of the person you're conferencing with.

The unit produced frame rates in the 7- to 11-fps range— depending on where we placed the slider control (that lets you trade off image quality for speed). Our video call connected on the first try; the images were crisp, with minimal pixelation. Audio lagged very slightly behind the video image. If you mind the lag, you can slow down the video by a fraction of a second.

The Video Phone's performance was generally impressive, as good or better than that of the kits we tested in the main roundup. We won't be at all surprised if in the near future the "Intel Inside" sticker refers to videoconferencing software as well as CPUs.

Intel Video Phone 2.0. List price: Not available. Intel Corp., Hillsboro, OR 97124; www.intel.com. *Circle 508 on reader service card.*

Where to Find VideoPhone

■ YES NO	Processor	Modem	Sends and receives video	Street price of basic systems (without monitor)
Compaq Presario 4824	Pentium II/233	DSVD Compaq 56-Kbps data/fax	■	$2,699
HP Pavilion 8100 series	Pentium MMX/200–Pentium II/300	Hayes-compatible DSVD 56K data/fax		$1,899–$2,999
IBM Aptiva Home PC series	Pentium MMX/233	Lucent 56-Kbps		$1,899–$2,699
NEC Ready series	Pentium/166–Pentium II/266	3Com x2	■	$1,999–$2,999
Packard Bell Platinum series	Pentium/233–266	3Com x2	■	$2,199–$2,499
Toshiba Infinia series	Pentium MMX/200–Pentium II/266	K56flex DSVD		$1,899–$2,899

Boca Video Phone Kit

Though a respectable performer on our tests, the Boca Video Phone Kit ($239 list) fell short in setup and interoperability. After an ornery installation, the unit was able to interoperate only with the 3Com Bigpicture—and even then its performance was not as good as when we connected with another Boca.

You'll need to purchase a V.80 modem separately, but the kit includes Sony's excellent CCM-PC5 color camera, which produces a sharp image. The built-in microphone uses an RCA jack rather than the more common 1/8-inch phone jack, so you may need to buy an adapter or use a separate microphone, as we did.

As with a number of the other kits, the Video Phone Kit bundles Smith Micro's VideoLink 324 software for point-to-point videoconferencing, and VDOnet Corp's VDOPhone for Internet connections.

Installation of the plug-and-play unit was straightforward, but not without its share of trauma. We experienced an IRQ conflict with our Vectra SCSI CD-ROM drive that necessitated uninstalling the CD-ROM. On the upside, Boca's technical support staff helped us troubleshoot the problem expertly. We had to change some of the default settings in the VideoLink

The Boca Video Phone Kit is a decent choice but difficult to set up.

Better to have a single BlackoutBuster™ than to curse the darkness.

PK **ELECTRONICS'** new BlackoutBuster is the only desktop UPS with the power and capacity to protect your entire computer system from power disruptions. Including the applications and files you're running.

From your Pentium PC to your color monitor, zip drive and laser printer, the BlackoutBuster features four outlets offering full battery backup, plus two more for surge suppression, as well as Internet line protection. And PK Electronics software will even close down your Microsoft (Windows or NT) applications and files automatically if you're not around.

PK Electronics backs it all up with the industry's longest warranty and largest guarantee. All in a box the size of your desktop dictionary.

Call us at 1888GOPKUPS today or visit us at www.pkworld.com. And next time you're cursed with a power failure or surge, you'll say "Oh, cool."

PK ELECTRONICS
Scottsdale, AZ

"*#!@!*#!"

CIRCLE 022 ON READER SERVICE CARD

Fish catches man,

① Photo of Will Simpson, 8, and Richard Simpson, 46, with cod, 11" long.

The HP PhotoSmart System. The first pictures of the future.

It's a complete PC photography system—digital camera, photo scanner, photo printer—that lets you shoot, scan and print real photos on your home PC. Together with Microsoft®

boy looks on.

©1997 Hewlett-Packard Company. Enlarged image of fish scanned and manipulated separately.

(2)

Photo of Will Simpson and of Richard Simpson, reduced 50%, then cropped and manipulated (by gleeful offspring) to dangle realistically from the end of fishing rod held by cod.

PictureIt!™ software, you can adjust exposures, change colors, crop and manipulate images—all as creativity dictates. To learn more, contact us at 1-888-HP4 FUN PICS or www.hp.com/go/PhotoSmart.

HEWLETT PACKARD

H.323: Videophones on the Net

By Don Labriola

These days H.324 POTS videophones may be getting all the attention, but videoconferencing solutions that work over IP networks may prove even more significant. The ITU's H.323, a standard for packet-network videoconferencing, is far broader in scope than H.324. Thus H.323 is expected to generate a wide range of products for the Internet, TCP/IP intranets, and Ethernet LANs.

H.323 includes specifications not only for end-user videophones but also for multipoint conferencing mechanisms, network-administration and bandwidth-management tools, and gateways that let H.323 devices communicate with H.320 (ISDN) and H.324 (POTS) video equipment.

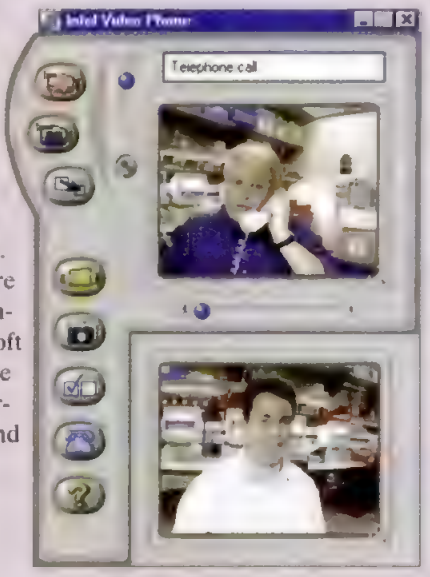
Because of their complexity, enterprise H.323 solutions have been slower to market than simpler POTS videophones. H.323 servers, gateways, and multipoint controllers from companies such as PictureTel, RADVision, and VideoServer are only just appearing.

Simpler H.323 videophones, which run over modem-based Internet connections, are already here. Unfortunately, their output quality can't match that of the average H.324 POTS product. Because of the Internet's lack of bandwidth-management tools and its unpredictable latency times and bandwidth, these videophones have difficulty maintaining unbroken audio and frame rates above the single digits.

One of the first Net videophones to support H.323 is the Intel Video Phone. Available only as a preinstalled component on new PCs, it requires a camera upgrade kit for full two-way videoconferencing. (For a full review of Video Phone, see the sidebar "Intel's Video Phone: Does It Steal the Show?").

NETMEETING & CU-SEEME

Despite Intel's advances, Microsoft NetMeeting is still the most popular H.323 product. Microsoft estimates that by the end of this year, it will have distributed more than 50 million free copies. That number is sure to increase substantially after Microsoft begins bundling the package with Internet Explorer 4.0 and Windows 98.



Intel's Video Phone lets you connect over either an IP network or analog lines.

NetMeeting incorporates the technology of a prior version of Video Phone, so its H.323 videoconferencing performance is similar to that of Intel's product. NetMeeting delivers robust data conferencing, including multipoint conferencing that conforms to the ITU's T.120 document-conferencing standard. In addition, Microsoft has released a developers' kit that has spawned compatible products and services from more than 60 vendors.

Even more flexible is White Pine Software's popular Enhanced CU-SeeMe. The most recent version (3.0) provides full H.323 support. Like NetMeeting and Video Phone, CU-SeeMe enables a variety of audio-, video-, and data-conferencing capabilities over IP networks. It also allows more sophisticated meeting formats, such as bidirectional multipoint videoconferences and one-to-many broadcast sessions. You can purchase it via White Pine's Web site (*www.wpine.com*) for $69, buy it conventionally for $99, or get it bundled with White Pine's video toolkit, CU-Sessories.

White Pine also offers its MeetingPoint (formerly Reflector) server software, which can connect users running any H.323- and T.120-compliant applications. It allows complex sessions that mix audio, video, and data conferencing over various transmission media.

Pro software installation, though.

The Boca Video Phone Kit is generally a fair contender, but its installation is not for the faint of heart—*Ted Needleman*

Boca Video Phone Kit. List price: $239. Boca Research Inc., Boca Raton, FL; 561-997-6227; www.bocaresearch.com. *Circle 491 on reader service card.*

Diamond Supra Video Phone Kit 3000

In a category marked by capabilities and features more absent than present, Diamond Multimedia Systems' Supra Video Phone Kit 3000 ($299 list) is a standout and deserves an honorable mention.

Bundled with the Diamond SupraExpress 336I modem, the Supra 3000 is one of the more comprehensive packages we tested, and its price is laudable. Setup went quite smoothly, but the product could interoperate only with the InterVision Pro.

The Supra 3000 requires a PCI and an ISA slot for the plug-and-play modem and video-capture card. The kit includes Philips' popular "eyeball" camera, the VDOPhone videoconferencing program, and Asymetrix's Digital Video Producer

The Diamond Supra Video Phone Kit 3000 has the best mix of price and features in this roundup.

4.0 software for video capture and editing. VDOphone lets you make both Internet and point-to-point calls.

Nice touches include the self-view feature, which helps to ensure that your face is properly framed on screen. The Supra 3000 is also the only product we tested that includes an extra patch cable for attaching a secondary video source such as a VCR or camcorder. Excellent picture quality and good sound round out one of the few tempting packages in the bunch.—*TN*

Supra Video Phone Kit 3000. List price: $299. Diamond Multimedia Systems Inc., Vancouver, WA; 800-727-8772; www.diamondmm.com. *Circle 492 on reader service card.*

Gallant InterVision Pro

One of two bargain-priced kits we tested, the Gallant InterVision Pro ($199.99 list) delivers adequate video, is easy to install, and provides surprisingly good interoperability. If you're browsing on the low end and can live without a fat software bundle, the InterVision Pro is worth a close look.

This bare-bones kit consists of a proprietary digital camera and PCI capture board and minimal software: VDOPhone and a capture utility. The camera reflects this economy. No vendor label is apparent, and a focus ring is the only control. Oddly, the camera offers privacy by means of a flimsy shutter in front of the lens. Other kits let you shut the camera off.

Bargain hunters will appreciate the InterVision Pro's ease of setup and interoperability.

The bundled version of VDOPhone permits both Internet and point-to-point conferencing. A video control-and-capture utility lets you adjust video parameters, exposure control, and capture rate. If you want video-editing capability, you'll need additional software.

Even Grandma Can Do It

By Ted Needleman

None of the PC-based H.324 POTS videoconferencing kits we tested installed quickly or easily. Even one of the better products, the 3Com Bigpicture Video Kit 1622, took more than 20 minutes to set up. We had to install two cards, then install the drivers and set up the applications. No problems slowed us down, but plug-and-play was a lot more like plug, work, and play.

But maybe you want a videoconference with grandma, who lives on the opposite coast and has trouble tuning her TV, let alone running a PC. Or maybe you envision setting up videoconferences with half a dozen clients so you don't have to travel as frequently.

The answer may lie with a new class of products—including C-Phone Corp.'s C-Phone Home and the ViaTV Phone VC100 from 8x8 Inc.—that connect to your telephone and TV. They provide POTS videoconferencing similar to that of the PC-based kits we tested but without the PC, the installation hassles, and the need for technical know-how.

C-Phone Corp. was not able to provide us with a unit before our deadline, but 8x8 did send us a pair of ViaTV Phone VC100s.

The ViaTV Phone looks much like a cable set-top box. It contains a color camera, a modem, and all the circuitry; the only component you need is a Touch-tone phone. The package also includes two long modular telephone cables for attaching the unit to a phone line and to a phone.

Setup involves plugging the telephone into the ViaTV Phone and connecting the ViaTV Phone to the telephone line, the TV, and AC power. We spent more time *unpacking* the unit than installing it.

ViaTV Phone takes about a minute to learn, and it comes with a Quick Reference card. The video screen pops up whenever you lift the phone handset; you control the unit through simple on-screen menus that appear when you press the pound key (#) on the phone keypad.

The functions are very similar to those of the PC-based kits. The ViaTV Phone uses a V.80 modem that meets the H.324 standard for point-to-point videoconferencing, so the unit should also work with other POTS videoconferencing systems. We tested the ViaTV Phone with the Intel Video Phone. As with several of the kits we tested with the Intel product, we failed to establish a connection when we initiated the call from the ViaTV Phone, but we succeeded from the Intel unit.

Who needs a computer? The easy-to-use ViaTV Phone looks like a cable set-top box.

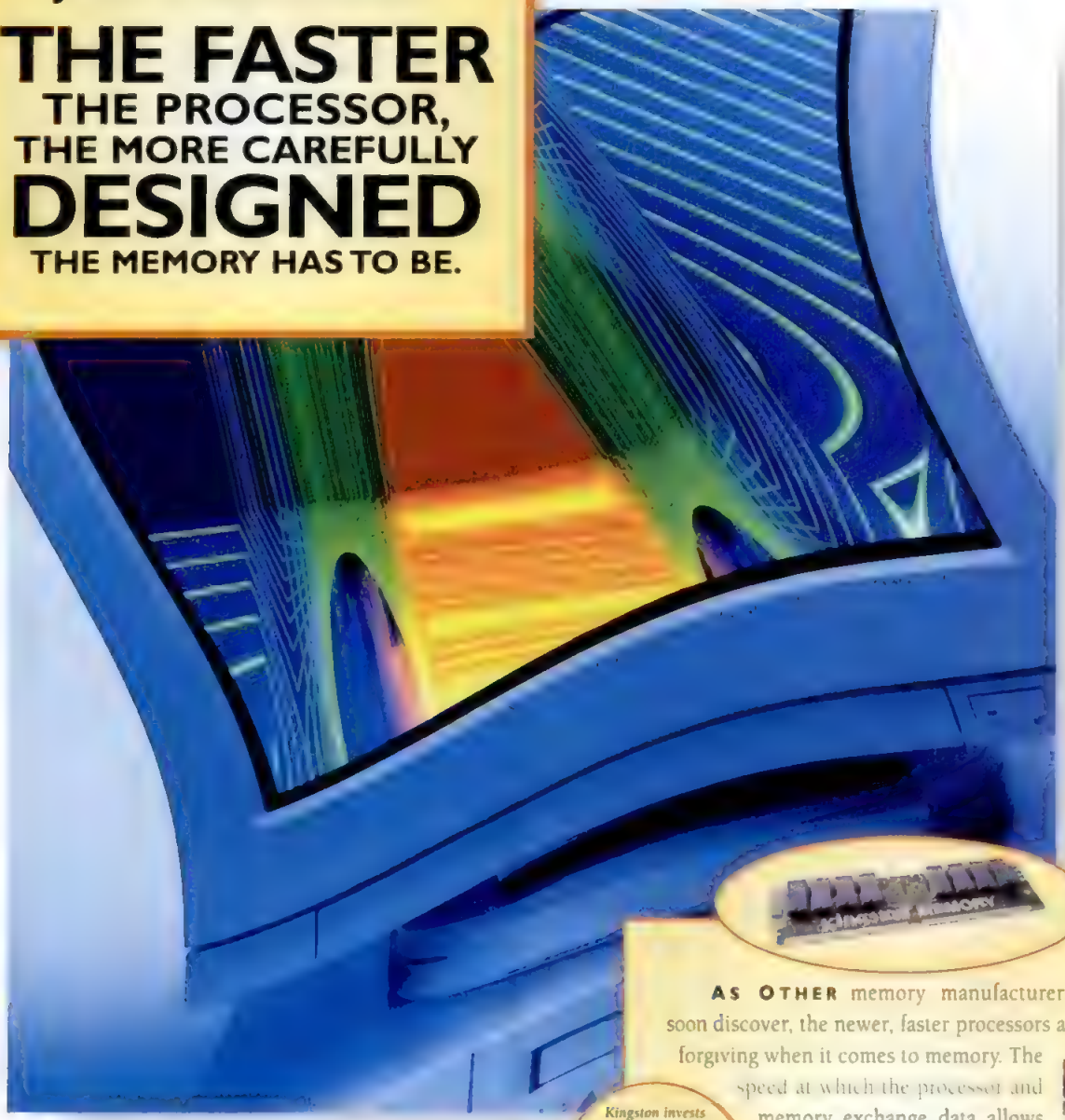
Image quality with the ViaTV Phone was surprisingly good. A fairly large amount of pixelization takes place when the frame contains gross motion; but only the moving object is distorted, and with minimal movement the experience is quite pleasant, at a frame rate of about 10 fps.

At more than $500, the ViaTV Phone VC100 is the most expensive POTS videoconferencing solution of those we tested. But it's the most usable, and probably the only one that grandma would stand a good chance of installing all on her own.

ViaTV Phone VC100. List price: $549. 8x8 Inc., Santa Clara, CA; 888-843-9898, 408-727-1885; www.viatv.com. *Circle 497 on reader service card.*

JUST A REMINDER:

THE FASTER THE PROCESSOR, THE MORE CAREFULLY DESIGNED THE MEMORY HAS TO BE.



AS OTHER memory manufacturers will soon discover, the newer, faster processors are less forgiving when it comes to memory. The speed at which the processor and memory exchange data allows less margin for error. So Kingston® has created the industry's most rigorous design, manufacturing and testing procedures

Kingston invests millions in advanced memory test equipment to guarantee that our memory meets the performance requirements of tomorrow's fastest processors.

www.kingston.com/ad

Want to find out the difference quality memory can make? Just visit our Web site at www.kingston.com/ad. Or call your preferred reseller. Or just call us toll-free at (800) 337-3806.

Kingston TECHNOLOGY

COMPUTING WITHOUT LIMITS.™

Kingston Technology Company 17600 Newhope Street Fountain Valley CA 92708 USA 714 435-2600 Fax (714) 435-2699 © 1997 Kingston Technology Company All rights reserved
Computing Without Limits is a trademark of Kingston Technology Company All other trademarks and registered trademarks are the property of their respective owners

PC MAGAZINE CIRCLE 106 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

SUMMARY OF FEATURES — See www.pcmag.com for interactive views

Desktop Videoconferencing Kits

■ YES ▒ NO

Products listed in alphabetical order	Boca Video Phone Kit	Diamond Supra Video Phone Kit 3000	Gallant InterVision Pro	Panasonic EggCam GP-KR0011	Tekram How-R-U Video Conferencing Kit	3Com Bigpicture Video Kit 1622
List price of tested configuration	$239.00	$299.95	$199.99	$199.00	$300.00	$399.95
Minimum system requirements:						
Processor	Pentium/75 or better	Pentium/100 or better	Pentium/100 or better	Pentium/90 or better	486/33	Pentium/75
RAM	12MB	8MB	16MB	16MB	8MB	16 MB
Slots required	1 PCI	1 ISA, 1 PCI	1 PCI	1 PCI	1 PCI	1 ISA, 1 PCI
Additional requirements	Microphone, speakers	Sound card, speakers	Sound card	Sound card	Windows-compatible sound card	2X CD-ROM drive (for installation), sound card
Full-duplex audio	■	■	■	■	■	■
Hardware video compression/decompression	▒ ▒	■ ■	■ ■	■ ■	■ ■	▒ ▒
Hardware audio compression/decompression	■ ■	■ ■	■ ■	▒ ▒	▒ ▒	■ ■
Internet/intranet conferencing	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Data conferencing	■	■	■	■	▒	▒
H.324/H.323/T.120 support	■ ■ ▒	■ ■ ■	■ ■ ■	■ ▒ ■	■ ▒ ■	■ ■ ▒
Modem	None	Diamond Multimedia SupraExpress 336i	None	None	None	3Com 56-Kbps voice/video fax modem
Camera						
Video camera	Sony CCM PC5	Philips Color Camera	Gallant InterVision Digital Color Camera	Panasonic EggCam	Philips Color Camera	Philips Color Camera (U.S. Robotics specs)
Tilt/swivel	■ ■	■ ■	■ ▒	■ ■	■ ■	■ ■
On-board controls:						
Power/Contrast	▒ ▒	■ ■	▒ ▒	▒ ▒	■ ▒	■ ■
Focus/Backlight compensation	■ ▒	▒ ■	■ ▒	■ ▒	■ ■	▒ ■
Software camera controls:						
Brightness/Contrast	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Saturation/Hue	■ ■	■ ■	■ ■	▒ ■	■ ■	■ ■
Format/Image size	▒ ■	▒ ▒	■ ■	▒ ■	▒ ▒	■ ▒
Frames per second	▒	▒	■	■	▒	▒
Integrated microphone	■	■	▒	■	■	■
Capture board						
Video capture board	Boca Video Phone Classic Board	Diamond Crunch It 1001	InterVision Capture Card	Miro Vidcon	Tekram C210	Hauppauge board (U.S. Robotics specs)
Still/motion-video capture	■ ▒	■ ■	■ ■	■ ■	■ ■	■ ■
Connectors	NTSC/PAL video	NTSC composite, S-Video	Camhost	NTSC, S-Video	CCD, NTSC composite, S-Video	NTSC composite
Plug and Play adapter	■	■	■	■	■	■
Software						
Videoconferencing software	Smith Micro's VideoLink Pro 1.0, VDOnet's VDOPhone 2.0	VDOnet's VDOPhone Professional 2.1	VDOnet's VDOPhone 2.0	Smith Micro's Video-Link 1.0, White Pine's CU-SeeMe 2.02	VDOnet's VDOPhone Professional 2.02	USR RapidComm Video 1.0, VDOnet's VDOPhone Internet 2.0
Fax/modem/voice-mail software	▒	▒	▒	▒	■	▒
Software takes advantage of MMX	▒	■	■	■	■ (H.324 only)	▒
Service and Support						
Warranty	5 years	5 years	1 year	2 years	1 year	5 years
Toll-free technical support	▒	▒	▒	■	▒	■
Technical-support hours (eastern time)	8.00–6.30 M–F	8.00 A.M.–10:00 P.M. M–F, 11:00–7:00 Sat.	11:30–8:30 M–F	Live: 9:00–7:00 M–F; automated: 24 hours, 7 days	11:00–8.00 M–F	9.00–7.00 M–F
Web address	*www.bocaresearch.com*	*www.diamondmm.com*	*www.gallantcom.com*	*www.panasonic.com/alive*	*www.tekramusa.com*	*www.usr.com/bigpicture*

The plug-and-play InterVision Pro installed fairly easily, with no resource conflicts. If necessary, you can install the InterVision PCI card driver in Compatibility mode, which shares IRQs. We had to make some adjustment to frame rate in the control software to get the system to display video. The driver defaults to 30 fps, and all we saw was a black display until we dropped the rate to 15 fps. The documentation is scanty but, like the kit itself, was just enough to get us up and running.—*TN*

Gallant InterVision Pro. List price: $199.99. Gallant Computer Inc., Fremont, CA; 510-656-5887; www.gallantcom.com. *Circle 493 on reader service card.*

Panasonic EggCam GP-KR0011

Taking a different tack, Panasonic markets the EggCam GP-KR0011 primarily as a video-mail solution. Bundled with the product is an application that lets you record compressed, self-executing video clips that you can attach to standard e-mail messages. Like the Gallant unit, the EggCam costs close to $200.

The EggCam's most distinctive feature is its nifty little egg-shaped camera. Though the unit is easy to position on a desktop or monitor, its on-board features

ViewSonic® makes your bright ideas brilliant.

Remote control included

The PJ800 projects a sharp, crisp image even in well-lit rooms.

The new Macintosh® and PC compatible PJ800 is a 3-panel (1.3" each) LCD Projector that provides rich screen colors and eliminates the "wash out" typical on most 1-panel LCD projectors. Its eye-opening 800 x 600 true resolution brightens any presentation. And with Advanced Video Compression, you can get 1,024 x 768 resolution while the images stay as sharp as if they were not compressed. With a 200:1 contrast ratio, you can project anywhere from 30" to 300" diagonal with confidence. It comes complete with a remote control and a 260 Watt DC metal halide lamp that lasts up to five years with normal use. What a brilliant solution to your A/V needs.

PJ800
550 ANSI Lumens
3-panel 1.3" Active LCD
3,000 hour, 260W DC Metal Halide Lamp
800 x 600 (SVGA) or 1,024 x 768 w/Advanced Video Compression
Macintosh® & PC Compatible

Brilliant. But then, that's why ViewSonic is The Display Technology Company™.

ViewSonic backs the new PJ800 with the brilliance and value that have helped us explore and conquer new fields of visual excitement. In addition, the PJ800 is backed by our limited 3-year warranty on parts & labor.*

For more information call ViewSonic at (800) 888-8583 and ask for agent 6007, or visit our website at: www.viewsonic.com.

(909) 869-7976 Fax (909) 869-7958 • Internet: www.viewsonic.com • Specifications subject to change without notice

© Copyright 1997 ViewSonic Corporation • All rights reserved • *3 Year Warranty on Lamp

ViewSonic®

CIRCLE 298 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Panasonic's EggCam lets you attach video clips to your e-mail messages.

are sparse, consisting of only a focus ring and a microphone.

As with the Tekram unit, the videophone application refused to run with our Number Nine graphics adapter and Motorola modem. As a workaround, we reconfigured our test-bed with a Matrox Millennium graphics board and 3Com Video Modem. Otherwise, installation was straightforward.

The EggCam's software bundle is extensive, including Smith Micro's VideoLink 324 POTS videophone and the VideoLink Mail v-mail package, miro Computer Products' VidCap32 suite of video-capture utilities, and White Pine Software's excellent CU-SeeMe Internet conferencing software.

As with most products in this roundup, the EggCam produces tinny, speakerphone-quality sound and video that is on the average just smooth enough to maintain the illusion of motion. Interoperability with other H.324 POTS products is poor; the product was able to communicate successfully only with the InterVision Pro.

The EggCam gets points for style and price, and sending video clip attachments via e-mail adds to the fun.—*Don Labriola*

EggCam GP-KR0011. List price: $199. Panasonic Computer Peripheral Co., Secaucus, NJ; 800-742-8086; www.panasonic.com/alive. *Circle 493 on reader service card.*

Tekram How-R-U Video Conferencing Kit

In a field plagued by installation and interoperability problems, Tekram Technology's How-R-U Video Conferencing Kit ($300 list) falls in as a fairly capable, middle-of-the road performer. The camera and capture board are on a par with the other units we tested, but the software bundle is on the light side.

How-R-U includes Philips' popular "eyeball" camera, which features a built-in microphone, focus ring, and on-board controls for functions such as contrast, backlight compensation, and automatic white balance.

Installation was riddled with conflicts with our Number Nine graphics board and the HP Vectra's motherboard-based SCSI adapter. The workaround we used with the Panasonic unit did the trick for the Tekram product as well: We disabled

Tekram's How-R-U Video Conferencing Kit is an acceptable though uncompelling choice.

the SCSI interface and installed a Matrox Millennium graphics adapter.

The How-R-U interoperated only with the 3Com Bigpicture Video Kit 1622 and the Gallant InterVision Pro. Video quality and general functionality were comparable to that of the other units—just what you'd expect from a product based on the common VDOPhone software.

The How-R-U is an acceptable product if your interoperability needs are modest and you don't require video-editing software. For users who already have a V.80 modem, the kit's reasonable price makes it a safe though somewhat bland choice.—*DL*

How-R-U Video Conferencing Kit. List price: $300. Tekram Technology, Fremont, CA; 510-353-6099; www.tekram.com. *Circle 495 on reader service card.*

3Com Bigpicture Video Kit 1622

A strong contender in the same league as the Diamond Supra product, 3Com Corp.'s Bigpicture Video Kit 1622 also warrants an honorable mention.

Like the Diamond unit, the Bigpicture bundles a modem and uses Philips' "eyeball" camera. The Bigpicture's advantages include superior interoperability, an upgradable modem, and a hearty software package that includes a light version of Kai's Power GOO. Shoppers considering a package that includes a modem might find the Bigpicture's $399 list price tough to justify. If you're considering a kit without a modem, 3Com also offers a modemless version for a competitive $249 list.

The Bigpicture had trouble interoperating with the Supra, but it worked well with the Gallant and Tekram products, exhibiting top-tier video and sound quality. Installation was easy, partly thanks to excellent documentation that includes a road map–style chart of the process.

In terms of sheer quantity, the Bigpicture's software bundle deserves a nod. In addition to VDOPhone, it includes RapidCom for fax, speakerphone, multibox voice mail, and point-to-point videoconferencing capabilities. For fun, the RapidCom menu bar also gives you access to Kai's Power GOO. You get Asymetrix's Digital Video Producer for capturing and editing video streams. And like

The 3Com Bigpicture Video Kit 1622 is the only kit that bundles an upgradable V.80 modem.

VDOPhone, RapidCom's videoconferencing provides a self-view feature.

The Supra 3000 and the Bigpicture are the best this category has to offer right now. Which product suits you better may come down to personal preference.—*TN*

Bigpicture Video Kit 1622. List price: $399. 3Com Corp., Skokie, IL; 800-342-5877; www.usr.com. *Circle 496 on reader service card.* PC

Wildfire is, perhaps, our oldest enemy. And now we have a new weapon with which to fight it. Namely, the computer.

Now the extraordinary skill and courage of those who fight wildfires is augmented by computer data. Reconnaissance planes carrying infrared scanners and computers pour a constant stream of data to the firefighters on the ground. Wireless notebook computers display the exact movement of the fire across a map of the terrain. The firefighters don't have to guess where the fire will go. They know.

Inside the computers is rugged, reliable Seagate data storage technology. You see, Seagate is the leading provider of disc drive and tape backup systems for data storage and archiving. Even when the data is earth, wind and fire.

Seagate. We salute those who put their lives in front of the fire. And we support them with the very best technology we can.

One World. One Drive.

To learn more about Seagate and its products, see us at www.seagate.com or call 408-438-8111

Seagate

CIRCLE 271 ON READER SERVICE CARD
OR GO TO WWW.PCMAG.COM/ProductLink

For information on Seagate Tape Products, call 1-800-626-6637. Seagate and the Seagate logo are registered trademarks of Seagate Technology, Inc. © 1997 Seagate Technology, Inc.

STREAMING VIDEO

As the tools evolve and the network gets protected and the video quality becomes usable, it's clear you should head downstream. *By Jan Ozer*

A welcome reception

Ours is certainly a visual culture. Among other things, this has made video a popular medium in nearly any context. Naturally, the Internet and intranet communities would like to make it work for them, too. There's just one big problem: Video files have been too large and unwieldy to run in real time over small Internet pipes or even over most corporate networks (intranets).

One approach that has been gathering support is to "stream" the video—that is, to have the video player on the user's PC continually request video data from a server, so that the user does not have to wait for the entire file to download before viewing. When we first looked at streaming-video products more than a year ago ("Web TV Tunes In," March 26, 1996), our collective assessment was, "Not ready for prime time." This went for both Internet and intranet video. Today, though, while video quality has not yet become usable at modem speeds, packages that facilitate streaming video are doing a much better job at intranet speeds without taxing your network or server. So the question you need to consider for all

ILLUSTRATIONS BY ANDREW FAULKNER

IN THIS REVIEW

CVideoNow 1.2 beta 1 234
Microsoft NetShow 2.0 beta 237
RealVideo Server 4.0 238
StreamWorks 3.0.252 beta 238
TrueStream 1.1 beta 19 242
VDOLive 2.1 244
VivoActive 2.0 248
Vosaic MediaSuite 1.04 251
How It Works 234
Editors' Choice 237
Performance Tests 240
Summary of Features 244

www.pcmag.com

Join us online for updates on the evolving streaming-video market and bookmark InternetUser (www.internetuser.com) for reviews on the latest streaming-video players.

your corporate speeches and training videos is, Why aren't you using it?

Here, we evaluate eight streaming-video technologies for deployment on corporate intranets at 64 and 128 Kbps. The dramatic results reveal that streaming video has reached true usability at these bandwidths.

Corporations have traditionally implemented streaming video on their intranets using MPEG-1, a popular but unwieldy compression standard primarily intended for CD-ROMs. The streaming-video technologies in this roundup, on the other hand, produce much smaller data rates. Consider this: An MPEG-1 video stream has a bandwidth of 1.2 megabits per second (Mbps). That's more than 10 percent of the available bandwidth on a 10-Mbps Ethernet. With the same bandwidth you could send 19 video files at 64 Kbps or 9 video files at 128 Kbps, reaching many more users without costly hardware upgrades.

Of course, reaching more users is pointless if no one watches because the video quality is so poor. But we found that at these lower bandwidths, streaming-video developers have made great strides.

HOW IT WORKS

Streaming-video products must *compress* the video data traveling over the network using a *codec* (COder/DECoder). *Coders*—also called *encoders* or *compressors*—shrink video by replacing the original frames with more compact versions by using mathematical algorithms such as *wavelet*, *fractal*, and *discrete cosine transform* (DCT). Encoders are also based on standards such as *MPEG-1* and *H.263*. You judge an encoder by video output quality, such as the level of *artifacts*, or objects introduced to the picture by compression. *Decoders*, or players, decompress and play video.

Most streaming-video technologies use a *server* to ensure efficient video distribution to clients. Servers transmit video through a variety of network protocols including UDP, TCP, and HTTP.

When low bandwidth limits the client's ability to receive data, a *scalable* technology will ensure an unbroken audio stream by *scaling* the amount of video data transmitted. The simplest technique is *stream thinning*, in which the server doesn't transmit every frame to the client. Encoding with a wavelet algorithm also lets you send less information per frame, losing image detail but preserving the frame rate.—*JO*

CLEAR AND CRISP VIDEO

Defining video quality is subjective, since it relates more to the intended use than to a universal description. Streaming video is not approaching the quality of VHS, or even MPEG-1, but it is becoming increasingly usable in training, communications, and other corporate applications.

One objective measure of quality is the presence or absence of *artifacts*, roughly defined as flaws in the compressed video stream that weren't in the original. The first generation of 28.8-Kbps streaming video often exhibited artifacts like blockiness, fuzziness, color banding, and just plain distortion of the compressed image.

The current crop of streaming-video codecs are not immune to such flaws, but artifacts are now likely to occur only when the products are pushed to their limits by content, low data rates, or large video windows. With a video window 176 pixels wide by 144 pixels high (about 1/12 of a screen at 640-by-480 resolution), you can get a low-motion, talking-head video compressed to 128 Kbps that's relatively clear of artifacts—even when zoomed (enlarged without an increase in resolution) to a third of your screen. This doesn't guarantee that viewers will watch, but it does ensure that they won't be distracted by poor video quality.

GOOD NETWORK CITIZEN

Once you decide that the quality of streaming video makes the technology worth exploring, the other major issue to consider is whether you can stream video on your intranet even while people are using the network. Streaming video is a great networking application as long as you don't bring the network to its knees.

Network administrators will be more inclined to install streaming video on their intranets if three issues are addressed: first, that streaming video will not cause short-term data spikes that would interrupt other network functions; second, that total streaming-video use will never exceed a percentage set by the server software; and third, that video-processing requirements will not prevent the server from performing other network-related functions.

Since these issues are so critical, we focused a significant portion of testing on network utilization. The results varied by technology, but a surprising number of products satisfied all three requirements, letting you use streaming video without unduly interrupting other network functions.

If you've stayed away from using streaming video on your intranet because of bandwidth and quality concerns, it's time to take another look.

Cubic VideoComm Inc.

CVideoNow

ALL REVIEWS BY JAN OZER

If we had reviewed Cubic VideoComm's CVideoNow, 1.2 beta 1 when we looked at streaming video a year and a half ago, it might have fared reasonably well. Today, however, this first-generation product simply doesn't offer the video quality you should look for in a streaming-video solution. CVideoNow has most basic network management features, fast encoding, and a pleasant user interface, but its total system cost—$2,900 for a 20-stream server—is prohibitive, especially when products like VDOLive and VivoActive deliver superior quality for less.

Our Contributors: JAN OZER is a contributing editor of *PC Magazine*. He also is the president of Doceo Publishing, a developer of digital-video, Internet-related testing tools in Norcross, Georgia, and the author of *Publishing Digital Video*. JAY MUNRO was the project leader and DAVID LIDSKY was the associate editor in charge of this story.

SUITABILITY TO TASK *Streaming-Video Products*

POWER	CVideoNow	Microsoft NetShow	RealVideo	StreamWorks	TrueStream	VDOLive	VivoActive	Vosaic MediaSuite
Server installation/ configuration	Good	Excellent	Excellent	Good	Fair	Good	NA	Fair
Encoding	Poor	Excellent	Excellent	Poor	Poor	Excellent	Excellent	Fair
Player functionality	Good	Good	Excellent	Good	Fair	Good	Fair	Good
EASE OF USE								
Server installation/ configuration	Good	Good	Excellent	Good	Good	Good	NA	Good
Encoding	Fair	Poor	Good	Excellent	Fair	Excellent	Excellent	Fair
Player functionality	Good	Good	Excellent	Good	Good	Good	Good	Fair

NA—Not applicable. VivoActive is a serverless technology.

Server installation/configuration considers the ease of installation and the breadth of configuration and administration tools. Higher ratings are given for products with installation programs that automatically register MIME types and that allow stream-count and bandwidth constraints and control over placement of media files.
Encoding looks at the breadth of file types accepted, the availability of data-rate and content-oriented presets, the attainment of requested data-rate targets, and compression speed. Encoders also receive higher ratings for advanced features such as batch encoding, stream editing, multiple codec support, and multiple output formats (such as ASF).
Player functionality evaluates the richness of the tools available to the video viewer. You should have normal enhancement features such as pause and resume, zoom by 2, a digital timer, slider bars, and other mechanisms for enabling random entry to the video stream. The player should support Netscape plug-ins and Internet Explorer ActiveX specifications. Players with such advanced features as playback statistics, protocol selection, volume control, and push button presets score higher.

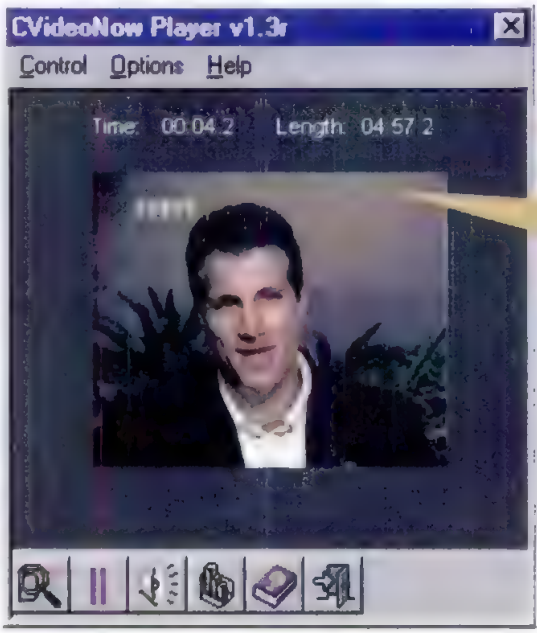
Because CVideoNow's wavelet compression scheme doesn't take advantage of the inherent scalability of wavelets, when the amount of data that can be sent over a connection drops below the desired video-stream bandwidth, playback pauses. A scalable solution would have sent less data instead, ensuring continuous playback.

Color distortion and frequent artifacts marred CVideoNow's talking-head clips. That and the low frame rate of the 64-Kbps clip accounted for CVideoNow's eighth- and ninth-place finishes on the 64- and 128-Kbps talking-head tests. CVideoNow dropped far below the target data rate on the high-speed clip as well; it placed ninth out of ten products on that test.

The nicely featured CVideoNow player offers a digital timer; pause, resume, and zoom-by-2 controls; and such playback statistics as streaming bandwidth and display rate. You cannot jump ahead or to a desired place in a video, though, as the player lacks fast-forward buttons and a slider bar.

Installing CVideoNow's server was fairly simple. The adjustments we had to make to run under O'Reilly's WebSite Professional were well documented on Cubic's site. The server assigns each outbound video stream a port and lets you limit the number of available ports, so you can control video consumption on the network.

The standalone encoder is extremely fast but has some problems. You encode by selecting a target data rate and choosing whether to prioritize frame rate or image quality. This didn't work at low data rates, forcing us to adjust the frame rate manually to achieve target bandwidths. And though we compressed our 45-second clip in 15 seconds, we ultimately had to drop the frame rate on the 64-Kbps talking-head test from 15 frames per second (fps) to 7 fps and the action clip to 3 fps to meet the target data rates.



Note the useful digital timer and the zoom-by-2 and pause-and-resume controls.

NOTICE!

CVideoNow's video was marred by random color smearing; look at the red and orange hues.

The encoder accepts .AVI files and outputs them in Cubic's proprietary .CVC format. A more polished encoder, such as VivoActive's, accepts all .AVI audio and video formats, but CVideoNow's encoder is much more restrictive, accepting only a few parameters.

All in all, poor video quality and a hefty price tag prevent CVideoNow from being a contender in the streaming-video arena.

CVideoNow 1.2 beta 1. List price: 20-stream server, $2,900. Cubic VideoComm Inc., San Diego; 619-505-2030; fax, 619-505-1508; www.cvideonow.com. *Circle 521 on reader service card.*

1 IN A FREE MARKET ECONOMY, *companies are always competing for capital. In fact, the market has never been more competitive than it is today. This increases the number of specialists needed to trade stocks. It also puts an additional burden on the technology needed to support them.*

Perhaps the first instance where computers are being replaced by people.

MultiSync LCD Monitor Series		
	LCD2000™	LCD400™
Viewable Size	20.1"	14.1"
Maximum Resolution	1280x1024	1024x768
Weight	22.0 lbs	11.5 lbs
Dimensions (W, H, D)	19.7x19x8.7"	14.1x14.3x6.7"
Brightness	150 cd/m²	180 cd/m²
Viewing Angle	160° conical XtraView technology	160° conical XtraView technology
LCD Type	Active Matrix	Active Matrix

Both models are compatible with PC, Mac, workstation or any VESA compliant analog RGB signal, no special card required

NEC MultiSync LCD2000
20.1" Viewable LCD Monitor

On Wall Street at least, it appears that less may actually be more. Because replacing big, bulky CRTs with flat panel displays makes room for more traders on the floor. For example, take NEC Technologies' new MultiSync® LCD monitors, including the world's first commercially available 20.1" viewable LCD monitor.

These flat panel displays take up 60% less space and weigh 70% less than a traditional monitor. Size, however, is not all that sets them apart.

Our XtraView™ technology enables clear and accurate viewing of the screen at virtually any angle. These monitors produce a brighter, sharper image than many CRTs. They eliminate eye-fatiguing flicker. They also consume up to 50% less power and have much lower emissions. Plus, these revolutionary monitors are compatible with most PCs, Macs and workstations.

To learn more, please call us at 1-800-NEC-INFO. Or visit us at www.nec.com. Expect more. Experience more.

NEC
NEC Technologies

2 THE TRADING FLOOR *is crowded with specialists. The trading floor is also crowded with big, bulky CRTs that hog energy, take up precious room and throw off a lot of heat. (Besides, as any trader will quickly tell you, it's already "hot" enough on the trading floor.)*

3 REPLACING A BIG, BULKY CRT *with a slim flat panel display actually makes room for more traders on the floor. Which is a good thing, since the trading volume on the major exchanges is higher than ever.*

4 MORE TRADERS MEANS MORE TRADES, *which means more money. (And let's be completely frank, shall we, what financial person doesn't like news like that?) In fact, one could even argue that migrating from big, bulky CRTs to slim flat panel monitors like the MultiSync LCD2000 could actually put a positive spin on the term 'downsizing.'*

MultiSync is a registered trademark and LCD2000, LCD400, XtraView, "Expect more. Experience more." and the NEC Technologies icon are trademarks of NEC Technologies, Inc. All other trademarks or registered trademarks are the property of their respective holders. ©1997 NEC Technologies, Inc.

CIRCLE 155 ON READER SERVICE CARD

Editors' Choice

- High-end: RealVideo 4.0
- Budget: VivoActive 2.0

PC MAGAZINE EDITORS' CHOICE

The perfect streaming-video solution for your intranet would offer high-quality video, top-notch network safeguards, and solid encoding tools. No one product is the best at everything, but Progressive Networks' high-end RealVideo 4.0 and VivoActive Software's budget-oriented VivoActive 2.0 present compelling packages. As the best solutions for their respective markets, these products each deserve our Editors' Choice award.

RealVideo is expensive, but it has the best mix of features and video quality. The RealVideo Server offers such network-friendly features as graphical management tools and protocol switching to get around firewalls. The standard-setting RealPlayer combines essential features with programmable destination buttons and a development kit.

VivoActive's serverless solution surprised us with high-quality video and network-utilization rates comparable to those of traditional products. On our jury tests, VivoActive delivered almost artifact-free video; using the quick, accurate, and full-featured encoder was a pleasure. At $695 for unlimited streams, VivoActive is the best value of any product in this roundup.

Microsoft Corp.

Microsoft NetShow

If you remember Video for Windows (VFW) and the effect it had on desktop video when Microsoft shipped the product in 1991, you may appreciate the potential NetShow has to do the same thing for streaming video. Like VFW, Microsoft NetShow 2.0 beta is part streaming-video technology and part platform architecture. It's very much a work in progress, however, offering average-quality video, a server with network-utilization safeguards, and a well-featured but slightly irritating player. It's all free, too; you need only Windows NT 4.0 to run the server.

The Microsoft NetShow player has many nice features including a timer, and useful playback statistics.

With NetShow, Microsoft supplies a full-featured server with such essential features as bandwidth and stream-count limitations and "intelligent fallover," which automatically changes protocols to avoid firewall limitations. NetShow has fairly crude encoding tools and average-quality codecs, however. Third-party tools vendors, such as Sonic Foundry, and codec vendors, such as Progressive Networks and Vivo Software, fill many of these gaps. Microsoft recently invested in Progressive Networks, and it plans to integrate RealVideo into NetShow and work to develop a standard around the Active Streaming Format (ASF).

After our testing concluded but before we went to press, Microsoft shipped NetShow 2.0 and announced that it had acquired VXtreme, whose Web Theatre product we tested for this story. By the end of the year, Microsoft plans to incorporate VXtreme's thinning and compression technologies and content administration utilities into a new NetShow beta.

NOTICE! *Microsoft NetShow includes a free MPEG-4 codec that produces publishable quality video.*

Because we tested Web Theatre separately, we cannot speculate on how well an integrated NetShow/Web Theatre product might perform, but we are reporting in this review the results of our tests with Web Theatre in order to give you an idea of the kind of functionality NetShow could gain through this acquisition.

To run the NetShow server, you need Windows NT 4.0 Service Pack 3 and Internet Explorer 3.0 or later. Installing NetShow as a service under Windows NT is straightforward, culminating in the launch of NetShow Administrator, a wizards-based configuration program hosted by IE.

We had some trouble compressing files for NetShow and found the result not necessarily worth the effort. Compressing files with Microsoft's video and audio codecs was a challenge, because Microsoft's beta tools couldn't encode our source .AVI files direct to ASF. Your only option using Microsoft's tools is to compress to a finished .AVI file, then convert to ASF with a command line utility. Our initial attempts using Adobe Premiere and Ulead Systems' MediaStudio failed, so we switched to Sonic Foundry's Sound Forge, which worked, but not without frequent, inexplicable errors.

The codecs bundled with NetShow produced average ratings on our jury tests. NetShow placed fourth and fifth on the 64- and 128-Kbps talking-head tests respectively and sixth on the action clip.

Web Theatre also produced respectable scores, tying with NetShow on the 64-Kbps talking-head test and placing fourth on the 128-Kbps talking-head test and fifth on the high-motion test. Web Theatre compresses via VXtreme's VXpress, a proprietary technology made up of both wavelet and DCT algorithms, and implements scalability by creating multiple-bandwidth files during encoding and adjusting bandwidth according to transmission throughput.

In addition to VXtreme, most of the jury-test leaders—including RealVideo, the RealVideo fractal codec, VDOLive, and VivoActive—will be available as alternative codecs for NetShow. Significantly, VivoActive's encoder produced .ASF files without difficulty, using

VivoActive's H.263-based codec.

Microsoft offers the NetShow player as a standalone application, a Netscape plug-in, and an Internet Explorer ActiveX control. The player is reasonably feature-rich, with pause/resume and zoom-by-2 controls, a slider bar, a digital progress meter, and comprehensive statistics.

Microsoft's partnering activity and acquisition of VXtreme are proof that it wants NetShow to be the Internet's multimedia platform. Combined with strong third-party support, a free server, and the promise of high-quality codecs, NetShow makes a strong argument for you to jump on the bandwagon early.

Microsoft NetShow 2.0 beta. List price: Free. Microsoft Corp., Redmond, WA; 800-426-9400, 206-635-1049; www.microsoft.com. *Circle 522 on reader service card.*

Progressive Networks Inc.

RealVideo

PC MAGAZINE EDITORS' CHOICE

Offering very good video quality, excellent network management tools, a functional encoder, and a highly engaging player, RealVideo 4.0, from Progressive Networks, should be very high on your short list if you're installing an intranet video system. At $6,995 for a 100-player license, it's not cheap, but you can try out a free 10-seat trial system first.

RealVideo consists of a server, an encoder, and a player. It also functions without a server—meaning you send the data via HTTP—but doing so dramatically increases bandwidth use.

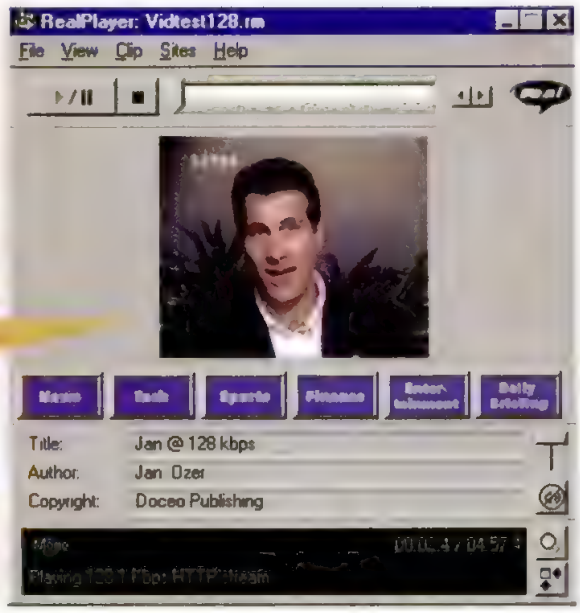
Progressive ships RealVideo with two codecs: the company's own, based on an undisclosed technology, and one licensed from Iterated Systems, based on fractal algorithms. We found a marked difference in performance. On our 128-Kbps talking-head test, the RealVideo and fractal codecs achieved gold and silver, respectively. At 64 Kbps, RealVideo tied for second, and the fractal codec slipped to sixth. RealVideo took third on the action clip, behind Vosaic and VivoActive, and the fractal codec dropped to seventh.

The RealPlayer feature set is the broadest in this roundup, offering such controls as pause/resume, zoom by 2, and volume, plus a status bar and a digital timer. A free, downloadable development kit lets you customize appearance, and programmable destination buttons simplify access to standard corporate media.

The feature-rich RealServer provides live and on-demand operation, graphical management tools, and the ability to limit network consumption by bandwidth or stream count. The server can switch protocols—to TCP, UDP, or HTTP—to work around firewalls, and it offers stream thinning.

NOTICE! *RealVideo's top-quality video makes it the leader of the streaming video pack.*

On our server-based tests, RealVideo posted normal network utilization scores. But Progressive Networks clearly hasn't discovered VivoActive's secrets for serverless mode: Network utilization spiked to over 40 percent, with the Web server transmitting HTTP data as fast as possible. If you're sold on RealVideo, purchase the server.



RealVideo's player has all the usual features, plus advanced features such as push-button site access and throughput status display.

Though competent, the RealVideo Encoder is not as full-featured or polished as some others. Unlike VivoActive, it doesn't directly support batch encoding, which lets you process multiple video files at once, and it suffers from rough edges, such as overwriting files under certain conditions. Still, you do get a command line utility for batch encoding plus others for such tasks as synchronizing multimedia events (which lets you add URLs to a video stream to enhance a video with Web pages) and programming image maps.

Our 45-second RealVideo clip compressed in a relatively fast 3 minutes 15 seconds, but the fractal clip, which uses a complex search algorithm, took a glacial 3 hours 32 minutes. At 64 Kbps and faster, the encoder was usually accurate but tended to overshoot lower data-rate targets—producing a 35-Kbps data rate, for example, after we'd specified 28.8 Kbps.

The RealVideo Encoder works as a standalone application or as an export function from Adobe Premiere or any third-party program that supports Progressive's encoder SDK. The standalone app accepts .AU, .AVI, .MOV, and .WAV files and can produce RealVideo's RM files with audio, video, or both; it can also encode live input. Progressive offers 13 audio codecs in addition to its 2 video codecs.

In this roundup, RealVideo has the best combination of video quality and features. If you need a streaming-video system today, RealVideo is the obvious choice.

RealVideo 4.0. List price: For 100 streams, $6,995. Progressive Networks Inc., Seattle; 206-674-2700; fax, 206-674-2699; www.real.com. *Circle 523 on reader service card.*

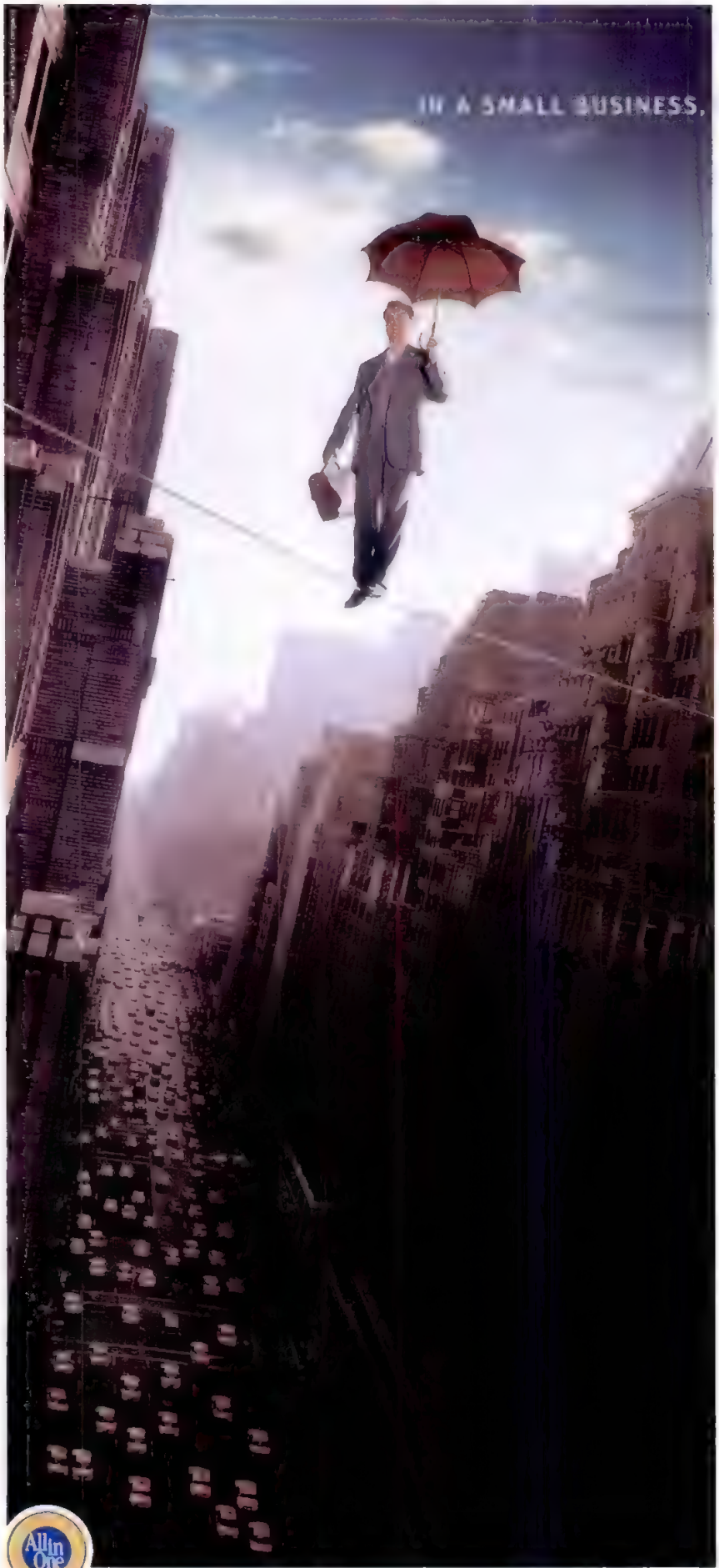
Xing Technology Inc.

StreamWorks

Built around the MPEG-1 format, Xing Technology's StreamWorks 3.0.252 beta features an encoder that produces high-quality video at CD-ROM bandwidths but doesn't scale down well, resulting in last-place finishes on our jury tests. The $3,000 price for 50 seats is reasonable, but you probably shouldn't consider StreamWorks unless you transmit the bulk of your videos at 256 Kbps or higher.

StreamWorks is based on MPEG-1, but its low-bit-rate files use an .MPX extension incompatible with MPEG-1 decoders other than StreamWorks'. StreamWorks Server supports live and on-demand video through stream thinning. StreamWorks also supports multicast transmissions, both live and on-demand.

StreamWorks placed last on all three



IN A SMALL BUSINESS, IT'S JUST YOU AND

YOUR WORK.

But there's help.

Introducing the HP OfficeJet Pro 1150C.

It prints.

It copies.

It scans.

All-in-One.

All-in-Color.

All for $899*.

All in One

Visit us at www.hp.com/go/officejet-pro

*Estimated U.S. retail price

HEWLETT PACKARD

PERFORMANCE TESTS

Streaming Video

PC MAGAZINE LABS

On our tests, RealVideo and VivoActive exhibited the best video quality overall, though no product excelled at displaying high-motion video. None of the streaming-video products put undue stress on the network.

What the Numbers Mean

No matter how useful streaming video can be as an application, you are not going to use it if it unduly stresses your server. And your users won't care that the network utilization statistics look great if the picture doesn't. Here is our examination of ten streaming-video solutions from both of those perspectives.

Bandwidth Utilization Our network tests focused on measuring network utilization during the simultaneous streaming of ten 5-minute videos at 64 and 128 Kbps. During the tests, we also monitored the server's CPU utilization to determine whether any technologies imposed disproportionately high CPU demands.

We expected our tests to highlight relative efficiency ratings among the server-based technologies. In addition, we expected them to emphasize a significant difference between server-based products and those, like VivoActive, that operate without a dedicated server component in addition to the Web server.

We were surprised to find that very little difference exists among the server-based technologies at ten streams, for either bandwidth; for that reason we have not charted the results. For the majority of the server-based streams, the ramp-up was steady, with no significant data spikes, increasing to a maximum of 12 to 15 percent for 128-Kbps streams and 5 to 8 percent for 64-Kbps streams, and then leveling off for the duration of the video clip. During that level portion, several streams held steadily to one network usage figure, while others bounced a percentage point over and under the average, but no activity truly distinguished one product over another. One oddity we did notice is that Vosaic MediaSuite kept the connection alive after the streams were finished and continued to consume network bandwidth at about half the streaming usage level until the clients shut down. Our less formal monitoring of CPU utilization uncovered very little difference among the server-based products, and we found nothing to give you pause if your server hardware is similar to ours.

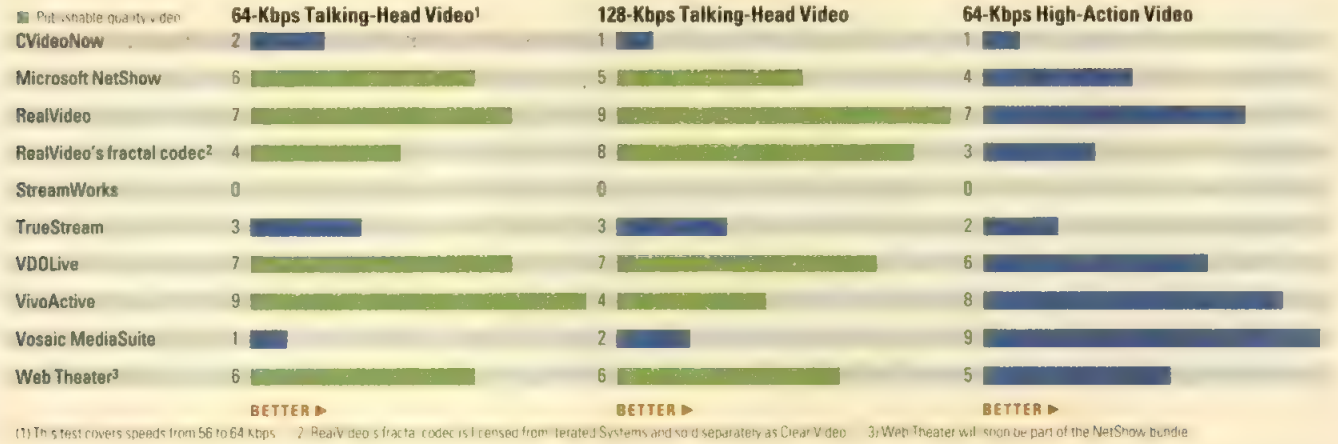
With network utilization figures hitting about 7 percent for 64-Kbps streams and 14 percent for 128-Kbps streams, every server-based technology we looked at can provide streaming video on an intranet without excessive interruption of normal network traffic.

Perhaps the most interesting discovery from our tests was that VivoActive, a serverless solution, posted network utilization results remarkably similar to those of the server-based technologies. VivoActive streams are distributed by the Web server using HTTP, which typically tries to deliver the requested file as fast as possible. For this reason, we expected significant data spikes when ten clients requested the VivoActive video from our server. Instead, the numbers made a quick spike at the start, then settled at a usage negligibly higher than those of server-based streams.

To accomplish this, the VivoActive player implements a TCP-layer flow-control feature that accepts data from the Web server, then displays video "just in time" on the screen. The server is fooled into thinking that it's servicing a connection with a throughput equal to the actual compressed video bandwidth. For this reason, VivoActive's network utilization averaged about 7 percent for 64-Kbps streams and 14 percent for 128-Kbps streams, no worse than that of its server-based competitors.

In an effort to compete against serverless technologies like VivoActive, Progressive Networks lets Web developers distribute

Jury Tests We pitted each technology against each of the others and picked a winner based on total video quality. We report here the number of wins that each codec received.



(1) This test covers speeds from 56 to 64 Kbps. 2. RealVideo's fractal codec is licensed from Iterated Systems and sold separately as ClearVideo. 3) Web Theater will soon be part of the NetShow bundle.

RealVideo-encoded files without charge—as long as you rely on the Web server itself and distribute the files via HTTP rather than using RealServer. RealPlayer doesn't implement the same protocols as VivoActive, though, so RealVideo distributed via HTTP is sent as quickly as possible, with the player attempting to download and cache as much of the stream as it can—not unlike a standard HTTP page request. This causes dramatic spikes in network utilization. On our 128-Kbps tests, for example, RealVideo traffic transmitted via HTTP topped out at 40 percent utilization for 10 streams and stayed above 30 percent for more than 90 seconds. Percentages that high effectively preclude other bandwidth-intensive network operations. Even though the serverless RealVideo solution is free, you definitely pay a price, as these results represent our worst fears for using streaming video on an intranet.

Even with low utilization numbers, some protective limitations, such as restriction by total bandwidth or by the number of simultaneous streams, are still a good idea. The most flexible products, such as RealVideo, offer both mechanisms; all server-based systems offer at least one or the other. By contrast, the serverless VivoActive offers neither, a disadvantage that makes a compelling case for using VivoActive's codec while running Microsoft NetShow, which has these protective controls.

Video Quality Jury Tests Since none of these streaming-video technologies create undue network burdens, we could evaluate them equally based on the quality of the video they produced. We tested ten technologies: the eight products in the roundup, Iterated Systems' Clear Video fractal codec (available with RealVideo), and the VXtreme codec (part of Web Theatre at the time of testing but now planned for integration in upcoming NetShow releases).

We jury-tested three files: a low-motion video featuring a talking head, compressed to both 64 Kbps and 128 Kbps, and a high-motion sequence compressed to 64 Kbps. We compressed all videos at 176-by-144 resolution (about 1/12 of an 800-by-600 screen) at 15 frames per second, unless the encoder had to drop frames, as TrueStream did, or shrink the resolution, as StreamWorks did, to meet the data-rate target. (Products allot varying proportions of bandwidth to audio and video data: we accomodated this variance by testing within a 56- to 64-Kbps range for the 64-Kbps talking-head test.)

Three jurors compared the products two at a time and selected the better of the two in terms of video quality. Our "Jury Tests" charts indicate how many times each product was chosen as superior to another. This mechanism provides an absolute ranking of the technologies but doesn't reflect the closeness in quality among the leaders on each test or the absolute usability of each video. On the 64-Kbps talking-head tests, for example, the differences among the top six contenders—VivoActive, VDOLive, RealVideo, NetShow, Web Theatre, and RealVideo's fractal codec—were relatively small, and all the clips were clearly of publishable quality. The last four contestants on that test—StreamWorks, CVideoNow, TrueStream, and Vosaic MediaSuite—all exhibited excessive artifacts or dropped frames that rendered their quality significantly lower than that of the top six.

On the 128-Kbps test, the pattern remained consistent, with the same top six contenders producing very high-quality video, and the bottom four, for reasons noted in the reviews, ranking far behind the leaders. Finally, the high-motion boat sequence illustrates what happens when you push a technology beyond its intended limits. Every codec exhibited gross artifacts, severe frame dropping, or both. Vosaic was the clear winner because of high color retention and good motion, but none of the technologies starred in this video.

Encoder Although the encoder should not be your primary consideration when evaluating these technologies, a good encoder can contribute a great deal to simplifying the process of implementing streaming video. Encoding tasks should be supported by advanced features, such as batch processing and user-configurable presets, and an encoder shouldn't take 3 hours to encode 45 seconds of video, as the RealVideo fractal codec did. (For more information, see the chart "Encoding Speed.")—*Analysis written by Jay Munro and Jan Ozer*

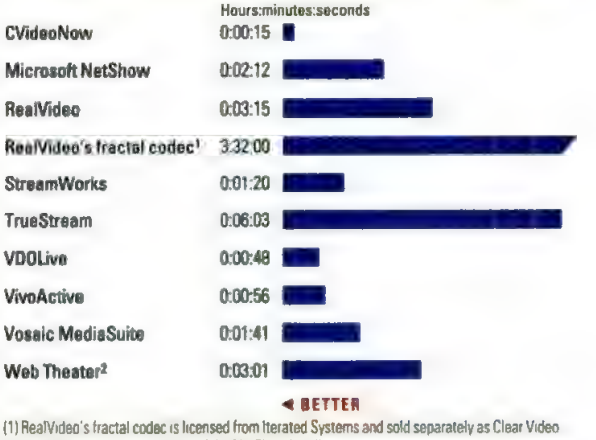
How We Tested

We tested on a Micron Millennia Pentium/133 server with 64MB of RAM, running Windows NT 4.0 Service Pack 3. We used O'Reilly's WebSite Professional 1.1h as our HTTP server. The network consisted of a closed 10MB Ethernet segment using 3Com EtherLink III cards and 3Com OfficeConnect hubs. Because some of the video servers required a C:\ drive installation, we set up Windows NT Server on a single partition. We monitored CPU utilization on the server and kept a Toshiba 3600 on the network segment to monitor network traffic.

The client test-bed consisted of ten Micron Millennia Pentium/166s, each with 16MB of RAM and running Windows 95 OSR 2. We installed Netscape Navigator 3.12 and Microsoft Internet Explorer 3.02 on each machine. (We opted for Navigator 3.12 to eliminate possible incompatibilities with Netscape's new Communicator suite.)

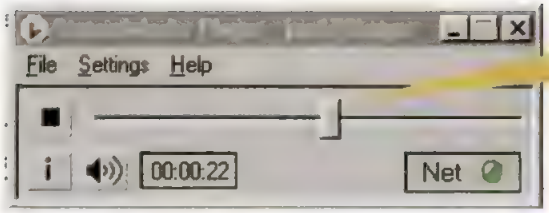
We performed our jury tests on two Micron Millennia Pentium/166s (two of our local clients). We selected and adjusted two monitors to match color and intensity as closely as possible. The video streams, requested from the main server, were displayed side by side. During jury testing, we randomly alternated the video streams between the two machines. We reran tests with the machines reversed to eliminate any monitor bias.

Encoding Speed We compressed a 45-second talking-head video to 64 Kbps. We repeated the test three times; these scores are average timings.

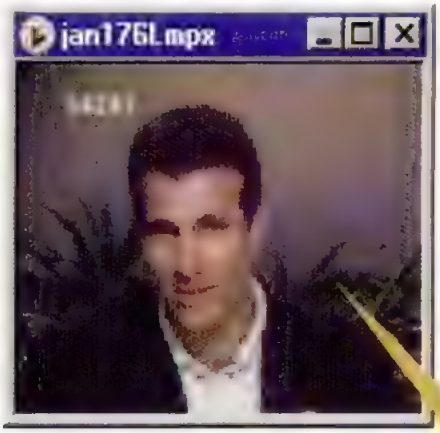


(1) RealVideo's fractal codec is licensed from Iterated Systems and sold separately as Clear Video
(2) Web Theater will soon be part of the NetShow bundle

Bandwidth Utilization Testing To gauge what kind of network and server load a network administrator could expect from implementing streaming video, we set up ten identical clients on a 10MB Ethernet segment. While streaming a 5-minute talking-head video encoded at 56 to 64 Kbps and 120 to 128 Kbps, we observed network utilization using an eleventh machine, a Toshiba 3600 laptop running Novell's LANalyzer for Windows 2.2. We started the machines individually but quickly to observe any spikes in usage.



NOTICE!
The StreamWorks player has a lot of nice features, including slider bar, timer and a status light.



NOTICE!
As with Vosaic MediaSuite, StreamWorks' video suffered from a blocky and fuzzy look.

jury tests. On the 128-Kbps talking-head test, StreamWorks lost points for using a smaller window than other products and for higher levels of artifacts. The smaller window also hurt performance on the 64-Kbps tests, as did the thinning mechanism, which cut playback to 1 or 2 fps.

StreamWorks Player is moderately well featured, with a color-coded status light, a slider bar, zoom by 2, a pause/resume control, a digital timer display, and comprehensive playback statistics such as display rate and throughput. StreamWorks Player is the only one in this review that can't play a file from disk. The only way to view a StreamWorks file is to upload the file to a StreamWorks server, a staggering inconvenience, especially since there's no technological reason for it.

You encode files using Xing Technology's MPEG Encoder, a sophisticated, feature-rich, standalone program that offers batch processing, standard and user-configurable data rates, and precise control over many MPEG-1 compression parameters.

All StreamWorks clips are compressed to 128 Kbps and dynamically "thinned" to the connection speed, allowing one clip to serve multiple bandwidths. Unfortunately, the Encoder wouldn't compress our test files to 128 Kbps at 176-by-144 resolution, forcing us to use StreamWorks' smaller 160-by-120 preset. Encoding our 45-second clip took 1 minute 20 seconds, which was good, but StreamWorks' MMX optimization would theoretically have produced much faster results on an MMX computer.

After installing the server—a relatively simple process—you access StreamWorks' configuration options via an administration icon in the Windows NT Control Panel. From there, you can control network video consumption by limiting stream count, total video throughput, or both.

Though StreamWorks was clearly a fish out of water on our low-bandwidth tests, it's still worth considering for 256-Kbps traffic.

StreamWorks 3.0.252 beta. List price: For 50 streams, $3,000. Xing Technology Inc., San Luis Obispo, CA; 805-473-0400; fax, 805-783-4930; www.xingtech.com. *Circle 524 on reader service card.*

Motorola Inc.

TrueStream

Motorola's entry into streaming video may intrigue you if you're familiar with the company's cellular phones. Unfortunately, TrueStream 1.1 beta 19 has a not-ready-for-prime-time feel, with poor video quality, inadequate server documentation, and a minimally featured player. Pricing is aggressive, with a $690 25-stream server and an $8,390 unlimited-use one. But its video quality is still far below that of other products.

TrueStream performed poorly on our jury tests, placing seventh on both talking-head tests and eighth on the high-motion test. Scores on the talking-head tests suffered from a lack of voice synchronization, seemingly caused initially by a playback rate of only 6 to 7 fps and later by a definite loss of audio-video synchronization.

NOTICE!
Pure still-frame quality wasn't the issue with TrueStream; it was slow playback.

Motorola attributed the synchronization loss to an overload on the playback computer, which means TrueStream decompression requires significantly more CPU horsepower than other technologies and may run even worse on computers slower than our Pentium/166 test-bed. The high-motion test result was similarly marred by low frame rate and poor quality.

TrueStream's bare-bones player offers zoom-by-2 and pause/resume features, but there is no progress bar, digital timer, volume control, statistics display, or other playback options.

The server, based on H.263 technology, is basic but functional. It isn't currently scalable, so unlike with products such as StreamWorks and VDOLive, video simply stops when the effective throughput can't support the streaming-file bandwidth. You can limit users by stream count but not by bandwidth. Installation on Windows NT was simple, but several configuration choices could have benefited from more documentation.

The TrueStream producer, available only as an Adobe Premiere plug-in, offers just the necessities. Operation is basic: You simply prepare the presentation in Premiere and choose the target data rate, which can range from 10 to 250 Kbps.

One interesting option is Dynamic Video Image Compression, which spreads information for specific frames over several packets, reducing the visible effect of packet loss. Motorola strongly recommends using this option for content that will be viewed over the Internet.

Motorola may want to compete in the streaming-video market, but TrueStream has a long way to go before it can catch up with others in video quality and features.

TrueStream 1.1 beta 19. List price: 25-stream server, $690; unlimited-use server, $8,390. Motorola Inc., Mansfield, MA; 508-261-4000; www.mot.com/truestream. *Circle 525 on reader service card.*

The TrueStream player is extremely basic, though you can pause and resume by clicking on the video.

Back up your business with a Travan drive and cartridges. Or kiss it all goodbye.

Tax files. Receivables. Customer names. If the unthinkable happens, they're history. Hang on to it with simple, reliable Travan® backup drives and cartridges available wherever computers are sold. Travan products are easy to use and made by companies you know and trust. You can use Travan technology to protect irreplaceable data on individual computers or small office networks because Travan cartridges come in sizes from 800 MB to 8 GB. And now the Travan quality you've known from 3M comes to you from an exciting new company, Imation. For the best Travan solution to meet your needs, see www.imation.com or call 1-800-888-1889, ext 6001. And hurry. You never know when your computer's going to take an unscheduled vacation. **We're thinking what you're thinking.**

IMATION
Borne of 3M Innovation

Travan backup system supported by:

aiwa EXABYTE HEWLETT PACKARD Seagate TANDBERG DATA TECMAR

Travan, Imation and the Imation logo are trademarks of Imation Corp. All other trademarks are properties of their respective companies. © Imation 1997

SUMMARY OF FEATURES

Streaming Video

■ YES ■ NO

Products listed in alphabetical order	CVideoNow	Microsoft NetShow	RealVideo (PC MAGAZINE EDITORS' CHOICE)	StreamWorks	TrueStream	VDOLive	VivoActive (PC MAGAZINE EDITORS' CHOICE)	Vosaic MediaSuite
Underlying technology	Wavelet	Varies	Info not available	MPEG-1	H.263	Wavelet	G.723, G.724, H.263	MPEG-1
Price/Number of streams	$2,900 / 20	Free / unlimited	$6,995 / 100	$3,000 / 50	$690 / 25	$299 / 5	$695 / unlimited	$150 / 1
Platforms supported:								
Microsoft Windows NT/Sun Solaris	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	N/A	■ ■
Digital Alpha/IBM AIX	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	N/A	■ ■
Linux/SGI-Irix	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	N/A	■ ■
Windows NT features:								
Installation routine	■	■	■	■	■	■	N/A	■
Remote monitoring	■	■	■	■	■	■	N/A	■
Bandwidth monitoring	■	■	■	■	■	■	N/A	■
Traffic statistics/Error logging	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	N/A	■ ■
Runs as service/executable	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	N/A	■ ■
Scalability mechanisms:								
Frame dropping	■	■	■	■	■	■	N/A	■
Other	■	■	■	■	■	■	N/A	■
Multimedia features:								
On-demand audio and video	■	■	■	■	■	■	■	■
Live audio and video	■	■	■	■	■	■	■	■
URL flip synchronization	■	■	■	■	■	■	■	■
Transmission standards:								
HTTP/TCP/UDP	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Multicast	■	■	■	■	■	■	■	■
Protocol negotiation for firewalls	■	■	■	■	■	■	N/A	■
Encoder								
Standalone application/Plug-in	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■
Video input format	.AVI	.AVI	.AVI, .MOV	.AVI	.AVI, .MOV	.AVI	.AVI	.AVI
Audio input format	.AVI	.WAV	.AU, .WAV	.WAV	.AU, .AVI, .WAV	.WAV	.WAV	.AVI
Maximum output resolution	320 x 240	320 x 240	320 x 240	352 x 240	352 x 288	240 x 176	352 x 288	352 x 240
Bandwidth presets	■	■	■	■	■	■	■	■
Player								
Windows 95/NT/3.1	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Unix/Macintosh	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Plug-in support for IE/Navigator	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Standalone player	■	■	■	■	■	■	■	■
Random entry/Pause and resume	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Progress bar/Timer display	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Volume control	■	■	■	■	■	■	■	■
Transmissions-protocol designation	■	■	■	■	■	■	N/A	■
Statistics	■	■	■	■	■	■	■	■
Push-button presets/Zoom video	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■

N/A—Not applicable: This product does not have a server component.

VDOnet Corp.

VDOLive

If you're looking for a stable, server-based technology for your intranet, consider VDOnet's VDOLive 2.1. This veteran of the nascent streaming-video market offers high-quality video and a wide array of configuration options, including the ability to limit network use by user number or stream count.

Only the higher quality of RealVideo's and VivoActive's video and the better functionality of RealVideo make those products stand out above VDOLive. VDOLive can transmit live or on-demand video from a range of server platforms. And if you're on a budget, you'll be pleased with VDOLive's price: A five-stream server for connections of up to 64 Kbps costs $299.

VDOLive operates with its own server or as a codec licensed to Microsoft for use with NetShow. Based on a wavelet algorithm, which can allow scaling to any resolution from a single file compression, VDOLive runs in scalable or nonscalable mode. In scalable mode, you create a relatively high-bandwidth file, which the server dynamically parses to send less data to lower-throughput connections, or to reduce data flow when effective throughput drops. In nonscalable mode, video quality remains constant but audio-video flow stops when available bandwidth drops.

Good video quality earned VDOLive a third-place ranking on the 128-Kbps talking-head test and a tie for second

Philips Brilliance® Monitors bring out your best.

BRILLIANCE®
HIGH RESOLUTION MONITORS

Philips Brilliance monitors bring out your best on the PC screen with pixel perfect display plus incredibly high resolution, color, accuracy, contrast and consistency. They're available in 15", 17", and 21" inch sizes. So, whether you're a design professional, office or small business user, or serious game player, we have the right size monitors for you. Look into a Philips Brilliance monitors today.

BU Monitors Website: www http: / / www. monitors. be philips. com or fax
Europe:31-40-273-5412 USA:1-770-821-2228 Asia Pacific:852-2-866-7358
CIRCLE 021 ON READER SERVICE CARD

PHILIPS

Let's make things better

IT REALLY IS LONELY

DELL™ LATITUDE™ LM M166ST
166MHz PENTIUM® PROCESSOR WITH MMX™ TECHNOLOGY

- 12.1" SVGA Active Matrix Display
- 72MB EDO RAM
- 256KB L2 Pipeline Burst Cache
- *NEW* 4GB Hard Drive
- Options Bay accepts 20X Max[Δ] Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Li-Ion Battery
- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- MS® Office 97 Small Business Edition
- Microsoft® Windows® 95
- IrDA 1.0 Standard Compliant
- Touchpad/Under 7 Pounds*
- Extendable 1 Year Warranty†

★ *NEW 56K Capable** x2 Modem, add $149.*
★ *2nd Lithium Ion Battery, add $199.*
★ *Leather Carrying Case, add $99.*

$3999

Business Lease[◊]: $141/Mo.
Order Code #800168

DELL LATITUDE LM M166ST
166MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

- 12.1" SVGA Active Matrix Display
- 40MB EDO RAM (72MB Max)
- 256KB L2 Pipeline Burst Cache
- 2.1GB Hard Drive
- Options Bay accepts 20X Max[Δ] Variable CD-ROM, 3.5" Floppy Drive, or 2nd Li-Ion Battery (all included)
- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Motorola 33.6 Fax Modem
- Leather Carrying Case
- MS Office 97 Small Business Edition
- Microsoft Windows 95
- IrDA 1.0 Standard Compliant
- Touchpad/Under 7 Pounds
- Extendable 1 Year Warranty

★ *Upgrade to 72MB EDO RAM, add $299.*

PICTURED SYSTEM

$3799

Business Lease: $134/Mo.
Order Code #800173

DELL LATITUDE LM M166ST
166MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

- 12.1" SVGA Active Matrix Display
- 40MB EDO RAM (72MB Max)
- 256KB L2 Pipeline Burst Cache
- 2.1GB Hard Drive
- Options Bay accepts 20X Max[Δ] Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Li-Ion Battery
- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- Motorola 33.6 Fax Modem
- MS Office 97 Small Business Edition
- Microsoft Windows 95
- IrDA 1.0 Standard Compliant
- Touchpad/Under 7 Pounds
- Extendable 1 Year Warranty

★ *Upgrade to 72MB EDO RAM, add $299.*
★ *2nd Lithium Ion Battery, add $199.*
★ *Nylon Carrying Case, add $69.*

$3499

Business Lease: $123/Mo.
Order Code #800169

DELL LATITUDE LM M166ST
166MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

- 12.1" SVGA Active Matrix Display
- 16MB EDO RAM (72MB Max)
- 256KB L2 Pipeline Burst Cache
- 1.6GB Hard Drive
- Options Bay accepts 20X Max[Δ] Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Li-Ion Battery
- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- MS Office 97 Small Business Edition
- Microsoft Windows 95
- IrDA 1.0 Standard Compliant
- Touchpad/Under 7 Pounds
- Extendable 1 Year Warranty

★ *NEW 56K Capable** x2 Modem, add $149.*

$2899

Business Lease: $105/Mo.
Order Code #800140

NEW DELL LATITUDE LM M133ST
133MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

- 12.1" SVGA Active Matrix Display
- 16MB EDO RAM (72MB Max)
- 256KB L2 Pipeline Burst Cache
- 1.6GB Hard Drive
- Options Bay accepts 12X Max[Ω] Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Li-Ion Battery
- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- MS Office 97 Small Business Edition
- Microsoft Windows 95
- IrDA 1.0 Standard Compliant
- Touchpad/Under 7 Pounds
- Extendable 1 Year Warranty

★ *Upgrade to 24MB EDO RAM, add $99.*

$2599

Business Lease: $94/Mo.
Order Code #800154

DELL LATITUDE XPi CD M166ST
166MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

- Network Designed Notebook
- 12.1" SVGA Active Matrix Display
- 16MB RAM (80MB Max)
- 256KB L2 Pipeline Burst Cache
- 2.1GB Hard Drive
- Internal 12X Max[Ω] Variable CD-ROM and 3.5" Floppy Drive
- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- Microsoft Windows 95
- IrDA 1.1 Standard Compliant
- Optical Trackball/7.4 Pounds
- Extendable 1 Year Warranty

★ *Upgrade to 40MB RAM, add $299.*
★ *Upgrade to a 3GB Hard Drive, add $199.*

$3499

Business Lease: $123/Mo.
Order Code #800153

†For a complete copy of our Guarantees or Limited Warranties, please write Dell USA L.P., Attn: Warranty, One Dell Way, Round Rock, TX 78682. ◊Business leasing arranged by third-party leasing companies to qualified customers. Ω12X Max./6X Min. Δ20X Max. 11X Min. *System weight with floppy drive or CD-ROM in options bay. **x2 products are capable of 56Kbps downloads. Due to FCC rules that restrict power output, however, current download speeds are limited to 53Kbps. Upload speeds are limited to 33.6Kbps. Actual speeds may vary depending on line conditions. ★Prices and specifications valid in the U.S. only and subject to change without notice. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. MS, Microsoft and Windows are registered trademarks of Microsoft Corporation. ††Advertised configurations may vary from tested configuration. ©1997 Dell Computer Corporation. All rights reserved.

AT THE TOP.

READERS' REPORT CARD

Notebook Vendors

A	Dell
B	Hewlett-Packard
	IBM
	Micron
	NEC
	Toshiba
C	Apple
	Compaq
	Gateway
	WinBook
D	Acer
	AST
	Texas Instruments
	ZDS
	ZEOS

PC MAGAZINE
JULY 1997
SERVICE AND RELIABILITY SURVEY

When it comes to service and reliability, who's the one notebook maker you can truly count on? According to the nearly 8,500 people who responded to *PC Magazine*'s 10th Annual Service and Reliability Survey, there is only one. (Impressive considering they rated some 3,800 notebooks from 15 vendors, isn't it?) How did we earn the only "A"? Over the last year, our users reported better than average scores on four key measures: satisfaction with reliability, repair experience, and technical support; and the need for recent repairs. They also said they'd buy one again. To say the same for your notebook, visit us on the Web or give us a call.

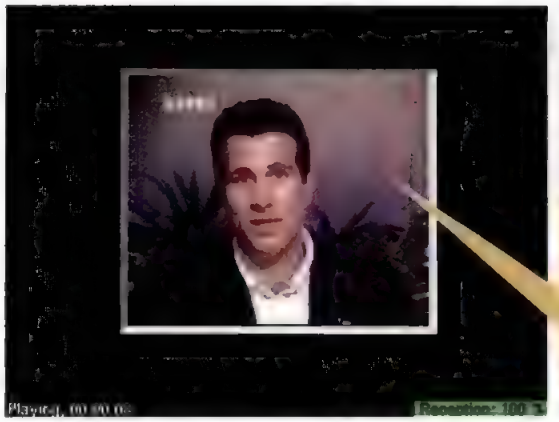
MMX intel inside pentium PROCESSOR

TO ORDER TOLL FREE
888-686-3355
TO ORDER ONLINE
www.dell.com/buydell

Mon-Fri 7am-9pm CT
Sat 10am-6pm CT
Sun 12pm-5pm
In Canada, call 800-233-0702

Keycode #04542

DELL®



Like most embedded players, VDOLive's offers few navigational controls; VDOLive's standalone player is relatively feature-rich.

with RealVideo on the 64-Kbps talking-head clip; the highly presentable clips exhibited a bit more artifact intrusion than Progressive Networks' codecs at high bandwidth or VivoActive's and RealVideo's at 64 Kbps. Greater relative distortion in the action clip pushed VDOLive to fourth place.

You get several useful features with VDOLive's player, including a playback timer, zoom by 2, volume control, and gauges that monitor effective bandwidth and audio and video skips. A lack of navigation controls—such as a slider bar or pause/resume—makes the player less functional than RealPlayer, for example.

VDOLive compresses quickly, encoding a 45-second test clip in 48 seconds. Though accurate for lower-bandwidth targets, VDOLive had difficulty creating higher-bandwidth clips, maxing out at around 106 Kbps even when we requested 256 Kbps.

Because VDOLive encodes into standard .AVI format, you can use popular tools like Adobe Premiere. VDOLive offers four encoding options, so you can present your video at various rates, including a 1-fps slide show and a full, 15-fps video. We created nonscalable files for our jury tests using the Lite encoding option, which transmits via HTTP—good for dealing with firewalls. (In future releases, VDOLive will not have Lite mode but will, like RealVideo, switch automatically to HTTP on detection of a firewall.)

Installing VDOLive's server is fairly simple provided your Windows NT server accepts the default parameters. Ours did not, so we configured most options manually. After installation, you access server controls from the Windows NT Control Panel, where you can set the maximum number of users and maximum throughput.

NOTICE!

VDOLive produced very good video quality: Note the smooth gray walls and sharp detail.

VDOLive provides good video quality, easy file creation, and a competent server and player. For a small implementation, this inexpensive product would be a good choice.

VDOLive 2.1. List price: 5-stream server, $299. VDOnet Inc., Cambridge, MA; 888-283-6638; 617-528-6000; fax, 617-577-8907; www.vdo.net. *Circle 526 on reader service card.*

VivoActive Software Inc.

VivoActive

PC MAGAZINE EDITORS' CHOICE

For users who don't want to worry about server maintenance, VivoActive Software's VivoActive 2.0 is an inexpensive, high-quality, serverless technology that emphasizes ease of use and simplicity over a mass of features.

Because it has no server component, VivoActive can't protect network utilization by limiting users or video-transfer bandwidth. Users who need this feature should consider using VivoActive under Microsoft NetShow, a combo that beat NetShow's MPEG-4 codec in two out of three jury tests. With a total implementation cost of $695 for an unlimited number of streams, VivoActive is an ideal, inexpensive choice for smaller companies.

NOTICE!

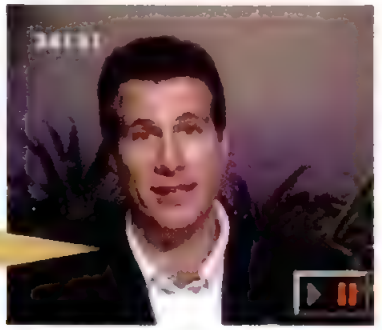
With great video, VivoActive took the top spot in our 64-Kbps talking-head jury tests.

Surprisingly bandwidth-friendly for a serverless technology, VivoActive uses special calls that force the Web server to distribute data in measured doses rather than as fast as possible, the modus operandi for most HTTP requests. VivoActive's technology is standards-based, using H.263 video compression and G.723 audio compression. Neither technology is scalable, so if bandwidths drop below the average data rate of the video, VivoActive stops playing until additional data arrives at the client.

VivoActive placed first on our 64-Kbps talking-head jury test, with relatively artifact-free video tarnished only by a hint of background banding and discoloration. Overall appearance improved only slightly in the 128-Kbps talking-head competition, and the banding and discoloration remained, so VivoActive dropped to sixth. VivoActive retained significant detail and clarity on the high-motion 64-Kbps test, rating second to Vosaic. We found the audio quality consistently good.

You can obtain the free VivoActive Player as an ActiveX control for Microsoft Internet Explorer 3.0 or as a Navigator plug-in. These plug-ins offer only the ability to pause/resume, making VivoActive much less functional than the players from Progressive Networks and VDOnet.

VivoActive Producer 2.0 is a polished, highly functional encoder with a number of useful options, such as bandwidth presets and batch compression. Producer inputs .AVI and .WAV files and outputs streaming files either in Vivo's proprietary .VIV format or, for NetShow, in .ASF format.



VivoActive's player lags behind others; pause/resume is its primary playback control.

The encoder is also reasonably fast, generating our jury-test video file in 56 seconds, and accurate, delivering close to the requested data rate without fuss. Vivo's encoder is one of the most fully featured and usable in this roundup.

To install VivoActive without NetShow, you register the VivoActive MIME types with the Web server and use the embed tag to integrate VivoActive video files into HTML pages. Vivo's excellent manual details both operations.

Techmedia 17" Monitors

High-Quality, High-Tech, Low Price

SURE, there are a lot of 17" monitors on the market, but only one brand has the quality and price performance you're looking for—Techmedia. We have been known in the industry for high-quality, high-reliability, value priced monitors, and our 17" models are no exception.

Our 1764 model features a 15.7" viewable screen, with a 0.28mm dot-pitch and F.S.T. double-focus gun that gives you clear, crisp, sharp images. And our top-of-the-line 1785 Model features a 15.75" viewable screen, with an 0.26mm dot-pitch and F.S.T. double-focus gun producing an incredibly sharp image. It's perfect for graphics and spreadsheet applications, and it can make the Internet come alive.

Both 17" monitors incorporate an invar shadow mask that gives you a brighter picture with less heat distortion. They also are PC and Mac compatible and feature Plug-N-Play technology, making Windows 95 auto-installation effortless. 14 Front Panel controls make user adjustments easy and convenient. And we are very proud to have been awarded the EPA Energy Star with our power management system, reducing your cost of operation even more. Add in a 3-year limited warranty and you have a price/performance value that is hard to beat.

The proof is in the viewing. If your looking for an upgrade, or are a first-time buyer, check out Techmedia's 17" monitors. You don't have to pay high prices for high-tech.

MSRP $499.00

MSRP $549.00

TigerDirect!

Techmedia®

Sales: 800-379-0877

Web Site: http://www.techmedia.net
Sales Fax: 714-620-3050

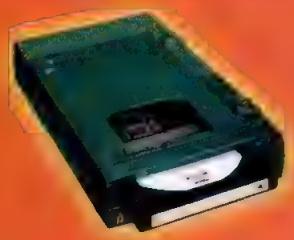
CIRCLE 174 ON READER SERVICE CARD
OR GO TO WWW.PCMAG.COM/ProductLink

STEVE JORDAHL
IS Analyst and Developer
McDonnell Douglas

Steve Jordahl is a hands-on guy. As MIS specialist and computer decision-maker for McDonnell Douglas, Steve works with people on the cutting edge of today's (and tomorrow's) aerospace technology. Whether they're designing science fiction-like space vehicles, logging flight data, or storing all kinds of top-secret stuff, the people who rely on Steve need space. Big space. Which is what they get when he hooks them up with a Jaz® drive.

So while the people in Steve's division work with space daily, when they need more of it, they rely on handy, removable Jaz disks.

Check out why McDonnell Douglas was among the first Jaz users at www.4inchsquare.com/pmg.



Super-Fast, Extremely Vast
PERSONAL HARD DRIVE.

iomega

"How we fit one interstellar launch vehicle, a few thousand flight hours, and reams of highly sensitive information into a 4 INCH SQUARE."

BECAUSE IT'S YOUR STUFF.™

© 1997 Iomega Corporation. Iomega, the Iomega logo, and Jaz are registered trademarks, and "Because It's Your Stuff" is a trademark, of Iomega Corporation. All other trademarks are property of their respective holders. The views expressed herein are the views of the endorser and are not the views of, and do not constitute an endorsement by, any person or firm for whom the endorser has provided services.

With outstanding format quality and a highly functional encoder, VivoActive is a great standalone, serverless technology. And you can always combine it with NetShow if you need more features.

VivoActive 2.0. List price: Producer, $695; Player, free. VivoActive Software Inc., Waltham, MA; 800-848-6411, 617-899-8900; fax, 617-899-1400; www.vivo.com. *Circle 527 on reader service card.*

Vosaic LLC

Vosaic MediaSuite

Although a promising entry in the streaming-video market and particularly adept at high-motion video, Vosaic MediaSuite 1.04 ultimately can't compete with such products as RealVideo or VDOLive on most intranet applications. Vosaic ranked near the bottom on our talking-head tests, and though the server, player, and encoder are functional, they're not as polished or feature-rich as those of other systems. You don't have to pay for the server, but at $150 per stream, Vosaic's technology is still relatively expensive.

Like StreamWorks, Vosaic makes use of MPEG-1 compression technology. But unlike StreamWorks, Vosaic separates the audio and video streams so the server can cut down on video flow and maintain audio synchronization in bandwidth-limited transfers. There's no protocol switching for firewall negotiation, as RealVideo and NetShow offer; though not an issue in most intranet settings, this could be a problem for broad Internet applications.

NOTICE! *Vosaic performed poorly; observe the blocky and fuzzy look on the face and back wall.*

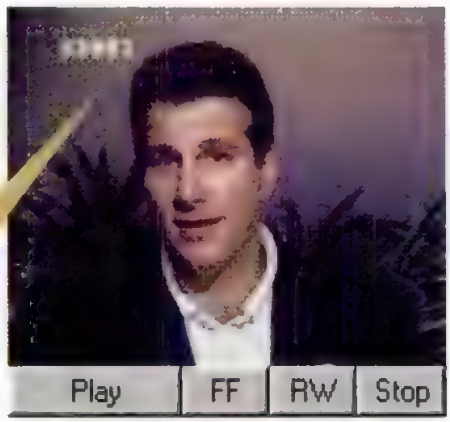
Vosaic's performance on the jury tests was decidedly bipolar. No product scored better on the high-motion test, for example. Vosaic retained startlingly good color with many fewer artifacts than other codecs. In the talking-head clips, however, Vosaic suffered from noticeably blocky backgrounds and from artifact intrusion around the numbers we had embedded in each frame, thus pushing Vosaic to eighth and ninth on the 128- and 64-Kbps tests, respectively.

Vosaic's player operates as a plug-in with the unique option to detach and play in a standalone window. Features include pause/resume, fast forward, and rewind, but there's no progress bar or digital timer display to show the duration of the video, time remaining, or any playback statistics.

MediaStudio, Vosaic's standalone encoder, accepts .AVI, .MOV, and many other formats. MediaStudio outputs separate audio and video files, a Vosaic .PAR file synchronizing the two, a pointer file, and an HTML file to integrate into your Web page—a profusion that can be somewhat confusing. Operation is fairly clear—especially with the wizards, which we used to create our test files—but the data-rate controls are crude, forcing you to choose among only four options, with no ability to specify output frame rate or data rate.

A valuable file-analyzer feature that ascertains frame and data rates for compressed files showed us that Vosaic's data rates varied widely by content, spiking during action sequences and smoothing when motion subsided. This bodes ill for streaming over fixed bandwidths, which works best with constant data rates.

To install Vosaic's relatively simple server, we ran a short setup program and configured the MIME type. You can manage network throughput by limiting stream count but not bandwidth.



Playback controls were rather sparse, with no digital timer or slider bar.

Though uneven video quality and lack of features may keep you from seriously considering Vosaic, its performance on the action clip will keep you watching.

Vosaic MediaSuite 1.04. List price: $150 per stream. Vosaic LLC, Urbana, IL; 310-315-9211; www.vosaic.com. *Circle 528 on reader service card.* PC

4-inch, 1 gig Jaz cartridges for as low as $89.95.*

HIGH-PERFORMANCE BACKUP

- Back up one gig in as little as 10 minutes
- Free 1-Step™ backup software backs up as much as 2 gigs (compressed)
- Run your entire system straight from your Jaz® drive to instantly recover from hard disk crashes

HIGH CAPACITY MEETS INSTANT ACCESS

- Run applications and files straight from disk
- Access time: 15.5ms read/17.5ms write
- Average seek time: 10ms read/12ms write
- Sustained transfer rate: 6.62MB/sec. max
- MTBF: 250,000 hrs.

HUGE FILES TO GO

- 1-gigabyte 4-inch disks fit in your pocket
- Portable external drives fit easily in your briefcase—internal drives also available
- Traveller and Jaz Cards make laptop use easy

PC AND MAC COMPATIBLE

- Windows 95, NT, and 3.X, Mac, DOS, OS/2
- IRIX and Solaris also available from Rorke Data

HOW TO CONNECT:

- Jaz Jet™ SCSI PCI $99
- Jaz Jet SCSI ISA $89
- Jaz Traveller (Parallel Port) $49
- Jaz Card (PCMCIA) $125

VISIT WWW.IOMEGA.COM
or see your reseller.

jaz drive $299 INTERNAL
$399 EXTERNAL

*When purchased in multi-packs. Prices listed are estimated street prices. Actual prices may vary. 1-Step and Jet are trademarks of Iomega Corporation. Windows 95 and Windows NT are trademarks of Microsoft Corporation. Mac is a trademark of Apple Computer, Inc. All other trademarks are property of their respective holders.

iomega

What 22 years in the monitor business gets you.

Premium Aperture Grille Monitor *technology. At a shadow mask monitor price.*

0.25mm Dot Pitch *for a brighter, clearer, tighter image.*

Full ***16.0" viewing area*** *shows more of what's on your screen*

Sharp, crisp, flicker- free ***77Hz resolution at 1280 x 1024***

Three-Year Warranty *for CRT parts & labor, of course.*

One-touch On-Screen Display *with digital controls.*

Used to be, there were two ways to get the sharper picture, richer colors and enhanced clarity of Aperture Grille technology. You could buy a high-end professional monitor from a company like NEC, Sony or Mitsubishi, with all the high-end features and a price to match. Or you could spend a lot less. And end up with a stripped-down imitation. Fortunately, that was then.

Now, of course, there's TeleVideo, the company that's been pioneering high-end technology for ordinary folks and quietly selling high-performance monitors at very reasonable prices since 1975. We've got a complete line of large-screen Aperture Grille monitors, including the flagship SVP260 pictured above. All with features comparable to (or even superior to) the Big Names, but at prices you can live with.

So how do we do it? Call **1-800-835-3228** to find out. Or visit us at **www.televideoinc.com**. But for now, let's just say that when you've been in the monitor business since bell-bottoms were cool, you learn a few things.

TeleVideo: good monitors, reasonable prices. (See for yourself.)

	Model	Aperture Grille (mm)	Refresh Rate (Hz) @1600x1200	H-Scan (KHZ)	MSRP ($)
17"	**TeleVideo SVP260**	**0.25**	**66**	**24-82**	**779**
	Mitsubishi 87TXM	0.25	66	30-86	829
	Sony 17sell	0.25	60	30-85	899
	ViewSonic PT770	0.25	66	24-82	799
17"*	**TeleVideo SVP270**	**0.25**	**75**	**30-95**	**889**
	Eizo-Nano TX-C7S	0.25	73	30-92	1125
	Nokia 447Xi	0.25	n/a	31-92	899
	Sony 17sell	0.25	60	30-85	899
21"*	**TeleVideo SVP350**	**0.28**	**85**	**30-107**	**1649**
	Mitsubishi 91TXM	0.28	75	30-95	1649
	NEC P1150	0.28	75	31-94	1599
	HYAMA Pro 21	0.30	75	30-94	1699

*Diagonal viewable area may vary.

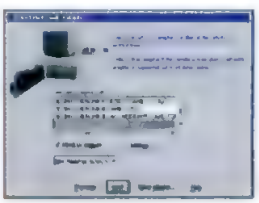
TeleVideo®
Over 20 Years of Display Technology

©1997 TeleVideo, Inc. The TeleVideo name and logo are registered trademarks and SuperView is a trademark of TeleVideo. All other names are the service mark, trademark or registered trademarks of their respective owners. TeleVideo reserves the right to change specifications without notice.

CIRCLE 060 ON READER SERVICE CARD

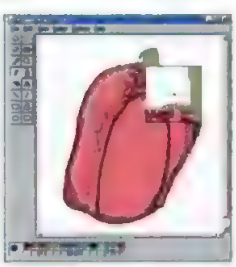
PC Tech

INSIDE

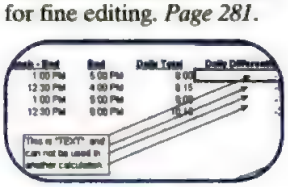


▲OPERATING SYSTEMS: Installing OS/2 remotely over a network can give you identical setups on multiple systems. *Page 265.*

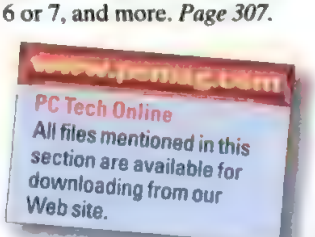
POWER PROGRAMMING: Build a sample Automation server application with a hierarchical object model using C++ and MFC's AppWizard. *Page 271.*



▲UTILITIES: ZoomIn magnifies an area in any Windows 95 application and slows down the mouse for fine editing. *Page 281.*



▲SOLUTIONS: Accommodating a new large hard disk on an old system, producing fold-over booklets in Microsoft Word 6 or 7, and more. *Page 307.*



Who Goes There?

Seven inexpensive Web analysis tools can help you determine who's visiting your site.

By Neil Randall

Web sites cost money. Lots of it. Sure, you can get yourself a freeware HTML editor and rent a few megabytes of space with a presence provider, but that's not the way of the corporate world. Clustered servers, high-speed connections, full network administration, professional design services, and intranet and extranet development don't come cheaply, and as the budgets for Web sites grow, so does the need for accountability. "We need a Web site!"—the cry of not too long ago—has now become a much more serious "What have you done for me lately?" Investment continues, but the demand for ROI has now come fully into play.

Web administrators need solid data on how their sites are helping their organizations. That can mean different things to different people, but for the most part it means gathering data that will reveal who's been visiting the site and what they've been doing there. As an administrator, you need reports on how many visitors you have per day and per hour, what times are most active for your site, how much data is accessed from your site per day and per visit, which pages are accessed most frequently, which files are downloaded most frequently, and on and on. You also need details on where your visitors come from, what browsers they use, which areas of the world hold the greatest numbers of your visitors, what computer platforms they own, and more.

You need, in other words, a complete profile of the traffic your site has generated.

All Web servers record extensive access information in their log files, simple text files that capture the server's activities. These log files can

ILLUSTRATION BY RICHARD DOWNS

be analyzed manually, and in the early days of the Web that's exactly what people did. But if a log file grows any larger than a few kilobytes, manual analysis becomes absurd, if not entirely impossible. When you consider that today's servers can generate log files in multimegabytes, often reaching a gigabyte or more, manual analysis is simply out of the question.

That's where a relatively new software category known as Web analysis tools comes into play. Although the category is still very much in the formative stages, the principle behind the tools is fairly well set. Highly variable in price, platform, and capabilities, Web analysis tools interpret the details of the interaction between a Web client (browser) and Web server. All of these packages focus to a degree on the log files generated by Web server software, in which resides data that can give you a fairly comprehensive look at the identities and activities of visitors to your site. But log files don't tell the entire story, and increasingly the developers of these tools are turning to an analysis of network activity itself as a means of providing useful data.

Bazaar Analyzer Pro

Bazaar Analyzer Pro, from Aquas Inc., is based entirely on Java. That's good news from one perspective: Reports can be viewed with any Java-enabled browser, which increasingly means all of them. Any server that can serve Java applets can support this product, and once again that includes all recent server products. With a Java-based analyzer, the log file needn't be transferred to the viewer's machine to be massaged. All you need is a set of queries over a well-constructed interface and you have the closest thing possible to instant reports across the Internet. Bazaar Analyzer, however, limits itself considerably by its ability to handle only the common log format (and the associated combined log format). As a log file analyzer, it works well, but most analysis tools are moving quickly beyond such limits.

On installation of Bazaar Analyzer, you establish an administrator, who creates individual user accounts, each with its own password. Authorized users can enter the site and select or customize a report. Users can establish profiles for their accounts, so when they return to the reports they've chosen, their profiles will be loaded and ready for use.

Reports can track daily, weekly, or monthly usage statistics. You can filter according to domain type (including country code) and file type. Reports include a full analysis summary, demographics, most and least requested pages, resources and bandwidth, and referring URLs. Reports are generated in your browser window, with graphs appearing as customizable Java applets.

Since obtaining reports through Java and across the Internet takes time, Bazaar Analyzer Pro includes an extremely useful feature called Auto, which combines with the user profile to generate reports at intervals you require and let you know via e-mail that your reports are ready. Then you log on to your server site through the Java interface and view the reports.

Bazaar Analyzer Pro is an excellent idea, but because Java still isn't ready for prime time, neither are the programs based on it. Using the program is fascinating but often frustrating, especially over slow connections. At this stage, Bazaar Analyzer Pro is useful only as a user-friendly means for intranet users to generate reports, and while that's good, it's not quite good enough. Once Java matures, this will be a much stronger product.

Bazaar Analyzer Pro. List price: $599. Aquas Inc., Sunnyvale, CA; 408-737-7122; fax, 408-737-1292; www.bazaarsuite.com. *Circle 484 on reader service card.*

Bazaar Analyzer's Java-based graphs include pull-down menus that let you select a different view of the data.

LOG FILES

Depending on the Web server you use, the log files will contain at least some—and possibly all—of the following information for each visitor access:

- the IP address of the browser making the request;
- its country code and domain name;
- the hour, minute, and second of the request, in addition to the date and day of the week;
- the HTTP method of the request;
- the path to the requested files;
- the response status from the server (the success or failure of the request);
- the number of bytes transferred in the transaction;
- the referring URL (where the visitor was when the request was made to your site);
- the user name, if authorization is required;
- the type of browser used by the visitor.

The log file for Microsoft's Internet Information Server captures the IP address and user name (often "anonymous"); the date and time of the request; the computer name and IP address of the server; the number of bytes received and sent in the request; the processing time in milliseconds; the name of the operation (HTTP method); and the target (usually the filename) of the operation. Also recorded are the status code of the transaction and the status code of the Windows NT server as well. A typical IIS log entry would look like this:

```
137.48.110.74, anonymous, 07/17/97,
23:52:19, W3SVC, SERVER7,
128.75.122.8, 348, 412, 2797,
200, 0, GET,
/custserv/compinfo/contacts.htm
```

In the above example, a request came from user "anonymous," at IP address 137.48.110.74, at 11:52:19 p.m. on July 17, 1997, to transfer the file contacts.htm in the directory /custserv/compinfo. The Windows NT service handling this request was WWW (W3SRV, as opposed to FTP or Gopher), and the server handling the request was SERVER7 at the IP address 128.75.122.8. The processing time was 348 ms, the request consisted of 412 bytes, and the returned data consisted of 2,797 bytes. The HTTP code of 200 indicates that the transaction was successful, and there was no Windows NT server code.

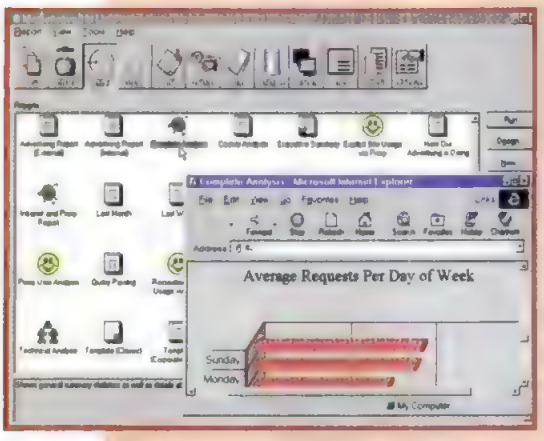
Every transaction between Web client and Web server results in a log file entry of this type. A busy server will generate a huge number of log entries, and the log file will grow very large very quickly, especially when a transaction involves embedded files such as inline graphics, which generate their own log entries. (If your home page contains six .GIF files, a request for it will generate seven log entries.)

There's another problem with large log files. In packages that are installed on a user's hard disk, the log file must be downloaded to the client machine in order to be processed by the analysis software. Typically, this is done via FTP and can be scheduled during off-peak periods. The primary packages support the transfer of files in .ZIP or GZIP format, and some will even compress and decompress on the fly, in order to compensate for the size of the download. Once downloaded, however, the data is quickly accessed. For Java-based packages or where the user's machine simply acts as an access client (as in the case of IIS Assistant), only the data in the form of the report is downloaded. The downside is the length of time needed for the transfer of information with each request.

Most Web server software now allows administrators to specify additional information to be captured, resulting in even longer log entries. Small wonder, then, that log files are huge and manual interpretations nearly impossible to perform. There are also several different types of log file, the more advanced being quite extended. The common log file format (CLOG or CLF) is standard across Web servers, but extended formats vary widely and can be modified. Your analysis tool needs to know the various formats.

OTHER MEASUREMENT METHODS

Log files are the basic site measurement tools, but the data they provide, however useful, is somewhat inaccurate and incomplete. For example, a time stamp is accurate only within a second, but a busy site deals in many requests per second, not just one. Nor does the log file easily indicate whether a visitor stopped a file transfer manually. In fact, you get little useful information on visitor behavior, because log files can offer no indication of the reasons behind a user's actions. Of course, there's no activity measurement tool on earth that can capture a user's boredom or excitement level, but even at a more basic level, such as the length of time between a user's request and the server's response, log files tend to be unhelpful.



The main window in HitList Pro offers icons for its many report types; you can view them in your browser (shown here) or as a Word file.

Hit List Pro

Hit List Pro 3.5, from Marketwave, offers a wide variety of preconfigured reports that help you track your Web traffic immediately after setup. The program has 27 reports in all, ranging from an advertising report to an executive summary, monthly trends, and a report on each virtual server. Version 3.5 reads Microsoft and Netscape proxy logs, allowing for full proxy reports.

Because Hit List creates its own relational database of your server logs instead of working directly from the logs themselves, it can let you configure reports for specific periods of time, for specific servers in a multiserver organization, or with many other advanced query types. All reports can be redesigned through the design feature available from the main window, and you can create new reports from scratch. The package comes with more than 250 report elements, and you can design your own as you need them.

Hit List's exemplary installation routine demonstrates some of the product's advanced features. You are cautioned if another analysis product has overwritten Microsoft's standard DLL for generating the information, and you are given full setup dialogs for features such as remote reports. Another dialog prompts you for details on how Hit List should handle the parsing of complex URLs, such as those generated by CGI scripts related to searches or other procedures. You're also prompted to tell Hit List how to recognize ads you run on your site, to take full advantage of the product's advertising report. Finally, you can exclude IP addresses (such as those for internal users or clients) from your reports, and you can also filter out accesses to multimedia files.

The first time you run Hit List, the software copies your log files into its QuickList Database Architecture format. This can take a long time, especially if you've been storing your logs since Day One, but once it's in place, the database is extremely flexible. On setup, Hit List lets you choose between storing only the summary information or storing summary information plus the full details of each transaction. In the first case, Hit List extracts a summary of each transaction as the server logs are being read into the database and can then generate reports from the summaries instead of the full detail. The detail includes path analysis (for jumps within the site) and Web server IP filtering, and although such information can be useful, processing it greatly increases the length of time Hit List takes to produce its reports. By choosing the summary option, you can keep the size of the database to as little as 5 to 10 percent of your log files, with much speedier report execution as a result.

You can configure Hit List Pro so that remote users can generate the reports they need. (Obviously, that can be a good thing; the last thing you need as a Web administrator is constant requests for reports from other departments.) Users can run their own local copies of Hit List and request reports from its interface, or you can use the Ad Hoc Forms feature to generate HTML forms they can use as request forms.

Hit List comes in three versions: Standard, Pro, and Enterprise. Select Enterprise for a multiserver environment or Standard for a free package with only 16 reports and a considerably slower reporting speed.

Hit List Pro 3.5. List price: $995. Marketwave, Seattle; 800-521-8176, 206-682-6801; www.marketwave.com. *Circle 485 on reader service card.*

SPEED FREAKS, POWER YOUR COMPUTER.

FEATURING SDRAM MEMORY, AN ULTRA ATA HARD DRIVE AND AGP CAPABILITY.

MONGERS, SHOW-OFFS, IS READY.

NEW DELL DIMENSION XPS D300
300MHz PENTIUM II PROCESSOR
FEATURING MMX™ TECHNOLOGY

- 64MB SDRAM Memory
- 512KB Integrated L2 Cache
- *NEW* 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- *NEW* 1200HS Monitor (17.9" v.i.s.)
- *NEW* Matrox Millennium II 8MB WRAM Video Card†
- 24X Max.§ Variable CD-ROM
- Creative Labs AWE64 Value Sound Card
- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer
- 56K Capable™ U.S.R. x2 WinModem
- Iomega Zip 100MB Internal Drive
- Microsoft® Office 97 Small Business Edition plus Bookshelf 96
- MS Windows® 95/MS IntelliMouse
- 3 Year Limited Warranty with 1 Year On-site Service

$3799

Business Lease◊: $134/Mo
Order Code #500928

NEW DELL DIMENSION XPS D300
300MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

- 64MB SDRAM Memory
- 512KB Integrated L2 Cache
- *NEW* 4.3GB Ultra ATA Hard Drive (9.5ms)
- 1000TX Trinitron® Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card*
- 24X Max.§ Variable CD-ROM
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers
- 56K Capable™ U.S.R. x2 WinModem
- Microsoft Office 97 Small Business Edition plus Bookshelf 96
- MS Windows 95/MS IntelliMouse
- 3 Year Limited Warranty with 1 Year On-site Service

PICTURED SYSTEM

$2999

Business Lease: $108/Mo
Order Code #500929

NEW DELL DIMENSION XPS D266
266MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

- 32MB SDRAM Memory
- 512KB Integrated L2 Cache
- *NEW* 6.4GB Ultra ATA Hard Drive (9.5ms)
- *NEW* STB Velocity 4MB AGP Video Card*
- 1000TX Trinitron Monitor (15.9" v.i.s.)
- 24X Max.§ Variable CD-ROM
- Creative Labs AWE64 Value Sound Card
- Altec Lansing ACS-290 Speakers with Subwoofer
- 56K Capable™ U.S.R. x2 WinModem
- Microsoft Office 97 Small Business Edition plus Encarta 97
- MS Windows 95/MS IntelliMouse
- 3 Year Limited Warranty with 1 Year On-site Service

$2799

Business Lease: $101/Mo
Order Code #500927

NEW DELL DIMENSION XPS D233
233MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

- 32MB SDRAM Memory
- 512KB Integrated L2 Cache
- *NEW* 4.3GB Ultra ATA Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card*
- 24X Max.§ Variable CD-ROM
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers
- 56K Capable™ U.S.R. x2 WinModem
- Microsoft Office 97 Small Business Edition plus Bookshelf 96
- MS Windows 95/MS IntelliMouse
- 3 Year Limited Warranty with 1 Year On-site Service

$2399

Business Lease $87/Mo
Order Code #500926

Yeah, we're talking to you. The one who likes to be on the edge. Correction. Make that over the edge. Which is exactly where the Dell Dimension XPS D300 is going to take you, screaming at a processor speed of 300MHz. More than just the latest megahertz demon, we've equipped this Intel® Pentium® II processor-based system with some of the industry's fastest features around. Like high-speed SDRAM memory that "bursts" data twice as fast as EDO memory. Perfect for optimizing multimedia applications. And an Ultra ATA hard drive; fast, efficient and up to 8.4GBs big. With two times the data transfer rate of non-Ultra ATA hard drives. And the newest muscle-machine status symbol: Advanced Graphics Port video capability. Faster than the traditional PCI bus, this techno-workhorse boasts accelerated graphic performance for both 2D and 3D applications. So give us a call and we'll build you one of these monsters today. Then strap yourself in for a real power trip.

DELL

TO ORDER TOLL-FREE
800-284-1160
TO ORDER ONLINE
www.dell.com/buydell

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT In Canada,* call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04541

***Product, as configured, will ship by October 20. Please call for updated shipment information.**

†For a complete copy of our Guarantees or Limited Warranties, please write Dell USA L.P. Attn: Warranty, One Dell Way, Round Rock, TX 78682 ◊Leasing arranged by third-party leasing companies to qualified customers. ΔOn-site service provided by an independent third-party provider. May not be available in certain remote areas. 4MB Baseboard with a 4MB Upgrade Module. §24X Max./12X Min. **x2 products are capable of 56Kbps. Due to FCC rules that restrict power output, however, current download speeds are limited to 53Kbps. Upload speeds are limited to 33.6Kbps. Actual speeds may vary depending on line conditions. *Prices and specifications valid in the U.S. only and subject to change without notice. Intel, the Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. MS, Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. ©1997 Dell Computer Corporation. All rights reserved.

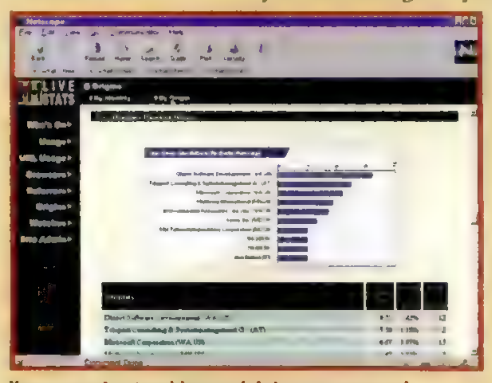
MMX intel inside pentium II

IIS Assistant

As its name suggests, IIS Assistant (IISA), from MediaHouse Software, is designed for Microsoft's Internet Information Server. In this API analysis solution, the product links directly to the IIS API in order to intercept data at the HTTP level and compile statistics on the fly. As an API solution, IISA doesn't access IIS log files at all, and the documentation encourages you to turn IIS logging off completely. You can use IISA in conjunction with a logging analysis package (they'll cooperate just fine), however, as a means of double-checking your statistics or to determine which method you prefer.

IISA offers support for up to 255 virtual servers and lets you analyze traffic across all of them. Its database (which compiles information on the fly) compresses data to a tiny fraction of its original size, and combined with the option of not using IIS's logging feature at all, that can mean extensive disk-space savings. Access to IISA is available through a Web browser, and the graphically rich reports are displayed according to the browser's capabilities—not surprisingly, Internet Explorer is a good choice.

IISA ships with only seven reports. Who's On gives you the IP addresses and locations of any visitors currently on your site, including where they came from to arrive at the site. Usage gives you details on individual user sessions, the site as a whole, bandwidth use, kilobytes served per user, and several hourly breakdowns of user data. URL Usage tells you which files have been accessed, and you can click on any of them to see exactly what your users are seeing. The Browsers report breaks down your visitors' browser use, while Referrers shows you how users got to your site, along with the referrer's URL, so you can see the context of the link. The Watches report provides you, in effect, with the history of individual user visits, plus who visited what resource.



Your reports, graphics, and data are accessed directly on your browser screen.

That doesn't seem like a lot, and compared with other analysis tools, it's not. But if speed, ease of use, and attractiveness of display are criteria, this is a package worth exploring. For full reporting packages, however, look elsewhere.

IIS Assistant. List price: $395. MediaHouse Software Inc., Aylmer, PQ, Canada; 819-682-9737; fax, 819-685-0994; www.go-iis.com/iisa/iisahome.htm. *Circle 486 on reader service card.*

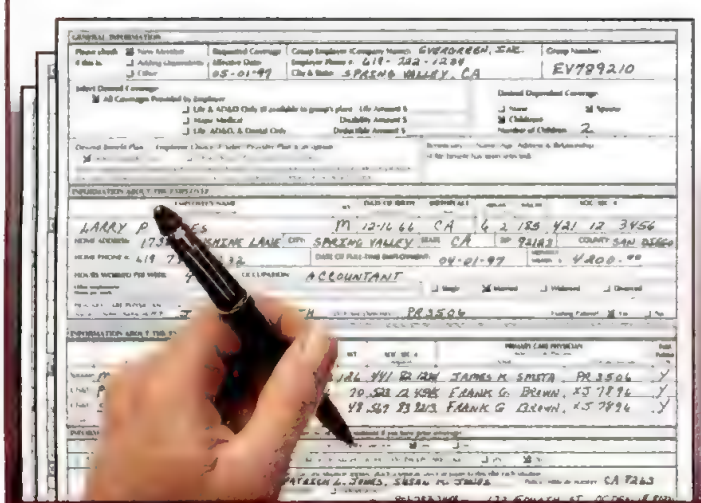
SURVEYS • SALES ORDERS • TIME CARDS • REGISTRATIONS • INSURANCE CLAIMS • PATIENT HISTORY • CREDIT APPLICATIONS

TELEFORM — AUTOMATED DATA ENTRY

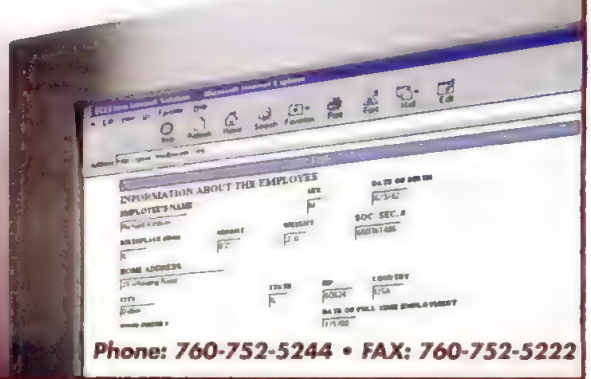
If your company enters information into a database, you need **TELE***form*, the data collection solution. **TELE***form* reads hand print from any form. It reads any data type from faxed, scanned, or even Internet-based forms. Create a form, print it, fax it, post it on your Web site. One form in any format, paper or electronic. Thousands of companies use **TELE***form* to reduce their dependence on manual data entry.

Any Form...Every Format!

Call today to find out more about TELEform, your Total Data Collection solution.
888-254-8915
www.cardiffsw.com



Cardiff Software



Phone: 760-752-5244 • FAX: 760-752-5222

EMPLOYMENT APPLICATIONS • TESTS AND EVALUATIONS • WARRANTY CARDS • READER RESPONSE

CIRCLE 177 ON READER SERVICE CARD

1 IN AN EMERGENCY, *split-second decisions mean the difference between life and death. Not surprisingly, then, the Red Cross puts a tremendous amount of importance on training and preparedness.*

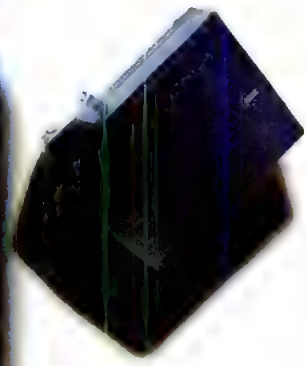
A good projector can save a meeting. A great one just might save a life.

MultiSync MT LCD Projectors		
	MT810	MT1000
Resolutions Supported	640 x 480, 800 x 600, 1024 x 768 with AccuBlend™ technology	640 x 480 800 x 600 1024 x 768 1280 x 1024 with AccuBlend™ technology
Video Compat-bility	NTSC PAL SECAM NTSC 4 43	NTSC PAL SECAM NTSC 4 43
Brightness	550 ANSI Lumens	450 ANSI Lumens
Weight	15 5 lbs	15 9 lbs
Dimensions (W H D)	15 6 x 5 7 x 12 6"	15 6 x 5 7 x 12 6"

Both models are compatible with PC Mac and workstation computers feature built-in audio and 2 years of InstaCare 24 hour replacement service

2 FOR MORE THAN A CENTURY, *the Red Cross has been quick to lend a helping hand. In addition to disaster relief, they present comprehensive health and safety programs such as CPR, HIV/AIDS education and Nurses certification programs. In fact, the Red Cross is a leading provider of such health and safety courses.*

4 IN A DISASTER, *one of the things that helps give you peace of mind is the rigorous training of the Red Cross. In a presentation, one of the things that helps give you peace of mind is the superior performance of the new MultiSync MT LCD projectors (not to mention their reliability and incredible ease of use).*



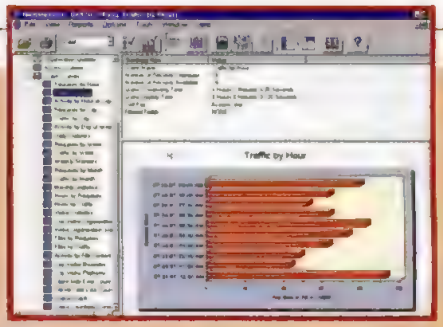
NEC
NEC Technologies

3 THE RED CROSS IS IN THE BUSINESS *of saving lives. In some ways, perhaps, one could argue that we are as well. You see, the new MultiSync MT Series LCD projectors are so reliable that they're backed by a whole new level of customer service. It's called InstaCare service from NEC Technologies. And in the unlikely event of a problem, it guarantees a replacement projector within 24 hours at our expense.*

CIRCLE 156 ON READER SERVICE CARD

MultiSync is a registered trademark and MT810, MT1000, AccuBlend, "Expect more. Experience more." and the NEC Technologies icon are trademarks of NEC Technologies, Inc. InstaCare service is a limited warranty and is only available in the U.S. and Canada. InstaCare is a service mark of NEC Technologies, Inc. ©1997 NEC Technologies, Inc

NetIntellect



The left pane of NetIntellect's report window shows the variety of information available to you in table, text, or graphic format.

NetIntellect has established itself as a versatile and solid log-file analysis tool, and with Version 2.5, WebManage Technologies has enhanced the product's speed considerably, by offering two modes, Fast Processing and Extensive Processing, as well as an option called Use Existing to eliminate the processing of log files every time you ask for a report.

Through compression, the NetIntellect database is as much as 95 percent smaller than your server logs. Compression is essential for reports spanning weeks, months, or even a full year, because without it the combined files are too large for processing. NetIntellect lets you process more than one log file at a time, and it provides a feature for comparing log files as well.

The product also supports a huge range of server log formats, including Microsoft, Netscape, Lotus Domino, all flavors of NCSA, Oracle, WebSite, Apache, and even Quarterdeck's WebStar for the Macintosh. That's good news for sites with multiple server platforms.

NetIntellect ships with five major report types and a host of built-in database queries. The reports offer information about your site's visitors, including their IP addresses, what they viewed, how long they stayed, and other details, and you can filter out unneeded data such as specific files and directories, IP addresses, or date ranges. You can generate your reports weekly, daily, or even hourly, and automatically e-mail them to preferred recipients.

NetIntellect's real strength lies in the ease of creating custom reports. By merging report elements with query types, you can develop reports that dig down to the information you require.

This is an easy-to-use program with loads of flexibility, especially useful for sites with multiple server platforms. It even runs on Windows 95.

NetIntellect 2.5. List price: $199; one-year upgrade subscription, $79. WebManage Technologies Inc., Hudson, NH; 603-594-9226; fax, 603-594-9227; www.webmanage.com. *Circle 487 on reader service card.*

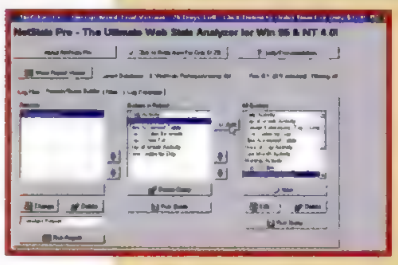
A log file records only HTTP server information and can't capture details that don't get past the TCP/IP layers and into the HTTP layer. That includes user-initiated disconnects as well as requests that never make it to the server. Staring at a status bar stuck on the "contacting host" message might be informative to users (you'll know when it's a good time to experience frustration), but that message never reaches the Web server log. And as any user can tell you, such experiences are a large part of the total Web experience and can do more than perhaps anything else to create a bad impression of your company.

Analysis tools are now beginning to employ other methods of measuring site activity. Products such as Andromedia's ARIA and Accrue's Insight (both currently unavailable for the Windows platform, although Andromeda has scheduled Windows NT support for the next version of ARIA) strive in their different ways to avoid log files completely. ARIA works with a server's API to monitor all server activity live, and Insight offers a monitoring system much lower in the network protocol chain.

Working with the server's API makes sense. The API is by definition programmable, and it offers flexible communication with its associated application. It also allows direct access to the server, so server activity can be monitored and analyzed as the activity takes place. Log files, on the other hand, merely report past activity, and since they are compiled daily at best, they're several hours out of date by the time they're analyzed. Capturing server traffic through the API allows the ARIA Monitor, a server plug-in, to get a significant head start on site analysis (by default, it reports hourly). And because live monitoring deals with less data than a log file's thousands of entries, performance of the server machine experiences less of a hit. Processing log files takes substantial time and system resources.

Live monitoring is obviously a much more useful approach than log analysis from the standpoint of up-to-the-minute site analysis, which a growing number of organizations require. It's also potentially more powerful, be-

NetStats Pro



The secret to NetStats Pro's power lies in its report customizability.

NetStats Pro, from Insanely Great Software, has none of the UI attractiveness of WebTrends and nothing approaching the full-featured appearance of Hit List Pro. But if you take the time to learn NetStats Pro, you'll find a fast, easy-to-use analyzer with considerable flexibility.

NetStats Pro works only with the common log format, and in that sense, it's quite limited in the reports it can offer. But it shines in its ability to customize those reports. NetStats Pro gives you a query builder with which you can construct your own customized reports. You can filter whatever fields you wish either into or out of the report (complete with multiple Boolean expressions and time/date ranges). Creating a customized report takes only a few minutes, and when you run it, you know it contains only the information you need.

The program can analyze local log files or download files from your server machine through FTP. The standard report includes details on the top three domain extensions from which your visitors come, the files they access, and the activity across the day and the week. To that, you can add error codes returned to users, the top 100 domains by access numbers and bytes transferred, and more. Once again, however, the power of the program lies in letting you decide precisely what you want to know. If you're using it solely as an out-of-the-box analyzer, then you're misusing it.

NetStats Pro. List price: $129. Insanely Great Software, Edison, NJ; 800-319-5107; fax, 908-632-1766; www.igsnet.com/netstats.html. *Circle 488 on reader service card.*

BOOKMARK
The Benchmark.

NEWSWATCH

WHAT'S HAPPENING TODAY, AND WHAT IT MEANS — ALONG WITH UP-TO-THE MINUTE NEWS STREAMED FROM THE INDUSTRY PRESS.

INSITES

HARD-HITTING OPINIONS, AND SAVVY WEB INSIGHTS FROM MICHAEL J. MILLER (EDITOR-IN-CHIEF), DON WILLMOTT (EXECUTIVE EDITOR, ONLINE), PLUS "NEWS, VIEWS AND SNIDE ASIDES" FROM JOHN C. DVORAK.

InternetUser

THE MOST COMPLETE AND CURRENT GUIDE TO INTERNET SOFTWARE AND TOOLS — AN INDISPENSABLE RESOURCE FOR ANY SERIOUS NETIZEN.

PC LABS Online

ALL THE GOOD STUFF YOU EXPECT FROM PC LABS, WITH INTERACTIVE FEATURES THAT MAKE IT EVEN EASIER TO DRILL DOWN TO THE INFORMATION YOU NEED.

EDITORS' CHOICES

YOUR LINK TO THE BEST OF THE BEST PRODUCTS IN EVERY CATEGORY.

Every day you'll find timely, comprehensive and labs-based reviews of the latest products and technologies. PC Magazine Online, your most valuable bookmark. www.pcmag.com.

PC MAGAZINE ONLINE

BOOKMARK
The Benchmark.

SUMMARY OF FEATURES: WEB ANALYSIS TOOLS

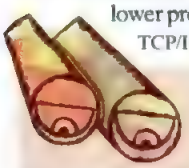
✓ YES ✗ NO	Bazaar Analyzer Pro 2.0	HitList Professional 3.5	IIS Assistant (IISA) 3.5	NetIntellect	NetStats Pro	NetTracker 3.0 Professional	WebTrends 3.5
Log file size	Unlimited	240MB, unlimited in database	N/A*	4GB	Unspecified	Unlimited	4GB
Log file types:							
NCSA Common/Combined/Extended	✓ ✓ ✓	✓ ✓ ✓	N/A*	✓ ✓ ✓	✓ ✗ ✗	✓ ✓ ✗	✓ ✓ ✓
Apache/IIS/Emwac	✓ ✓ ✗	✓ ✗ ✗	N/A*	✓ ✓ ✗	✗ ✗ ✗	✗ ✓ ✗	✓ ✓ ✓
Lotus/O'Reilly/Netscape	✗ ✗ ✓	✓ ✓ ✓	N/A*	✓ ✓ ✓	✗ ✗ ✗	✗ ✓ ✓	✓ ✓ ✓
On-the-fly compression/decompression	N/A**	✓	N/A*	✗	✗	N/A**	✓
Real-time analysis	✗	✗	✓	✗	✗	✓	✓
Number of predefined reports	28	27	7†	5†	1†	24	32
Customizable reports	✓	✓	✓	✓	✓	✓	✓
Report scheduler	✓	✓	✓	✓	✓	✓	✓
Reports in Word format	✗	✓	✓	✓	✗	✗	✓
Integrated database	✓	✓	✓	✓	✓	✓	✓
ODBC database support	Optional	✓	✓	✓	✗	✗	✓
Cookie processing	✓	✓	✗	✗	✗	✗	✓
Runs as a Windows NT service	N/A***	✓	N/A***	✗	✗	N/A***	✓
Virtual server support	✓	✓	✓	✓	✗	✓	✓
Intranet management	✓	✓	✓ (Win NT security)	✓ (via filtering)	✓ (via filtering)	✓	✓
Ad clickthrough analysis	✓	✓	✗	✗	✗	✓	✓
Java-based	✓	✗	✗	✗	✗	✓	✗

N/A*—Not applicable. The product does not use log files. N/A**—Not applicable. The product does not download log files. N/A***—Not applicable. Data is served from a remote machine. † The query system includes many report options.

cause an API can be programmed to capture specialized information not available through common logs. But despite its strengths, the approach suffers from one of the same drawbacks as do log files: It records interactions at the HTTP protocol level, not at the level of the lower protocols. HTTP rides on top of TCP/IP, which in turn rides on top of the NIC layer, and some important data can be collected only below HTTP.

Insight, like ARIA, offers a live monitor for Web traffic, but instead of operating at the level of the application API, Insight works at the level of the network protocols, where HTTP gets its data. It captures all attempts to access the Web site, whether successful or not, and offers reports that analyze all network activity pertaining to the HTTP layer. Nor does it sacrifice user information to do so; everything the log file receives comes through the lower layers as well.

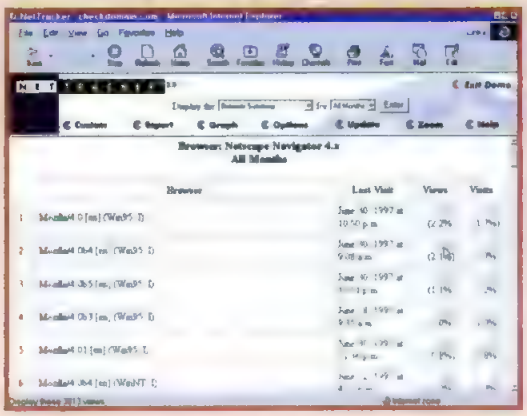
Specifically, Insight captures data that comes from a browser's attempt to initiate a TCP/IP connection at every stage through the point



NetTracker Professional

NetTracker 3.0 Professional, from Sane Solutions, relies on Java to get the job done. It resides on a Java-compliant server, and all access to reports and data is handled through a Java-enabled Web browser. Users need download no log files to their machines, nor do they need to run any software besides their browsers. For these reasons, NetTracker works well as a tracking package for ISPs, which can install it and add a subscription cost to the rates they charge for hosting user sites. Sane Solutions has an ISP partner program designed for that purpose.

The package generates a fairly standard set of reports, among them host and domain summaries, which show where users are coming from, and a user summary, including those who log in with a user name and password. The page and path summaries give data on the most accessed pages and the paths taken to retrieve them, and the browser and platform summaries let you determine the software and operating systems your visitors are using. Of particular use are the robot/spider summary, which lists the agents that have accessed the site for local indexing on user machines; the keyword summary, showing the keywords that generated referrals to your site; and the ad summary, offering a look at user behavior (click-through rates) in response to ads on your site.



The browser interface lets you drill down through NetTracker's reports to individual pieces of information.

Because NetTracker's interface is fully interactive, it can offer drill-down capabilities. The initial reports are surface-level, and you can effectively create your own more detailed reports by digging further. Reports offer hyperlinks that increasingly narrow the report's focus. As an example, the top level of the ad summary displays a listing of ads and their click-through numbers and rates. The

where the browser tells the server that the request has been fulfilled or abandoned. This means an administrator can track precisely such information as how long users are willing to wait for files to download as well as which multimedia elements are frequently aborted and which are routinely downloaded. The information helps Web developers fine-tune their sites to suit their visitors. Accrue calls the technique "on-the-wire" data collection.

The point of developing analytic solutions that bypass log files is to move the moment of data collection closer to the activities of the actual user. Ultimately, even the network layers aren't low enough to capture those activities accurately. For that, you'd need software on your visitor's machines capturing every mouse click from every session, since even information about attempted TCP/IP connections wouldn't explain why a user might have bypassed a link to your site in the first place. Given the outcry against software that transmits user data over the Internet (by cookies, for example), you're unlikely to be able to tap into a user's machine. But for now, the current crop of Web analysis packages offers more than enough information about how your site is being used.

The tools examined here are all standalone packages that retail for under $1,000 and are available for the Windows environment (Windows 95 or NT). We've excluded high-end packages such as Insight and ARIA for their lack of Windows support and net.Genesis's net.Analysis Pro for Windows NT for its price ($2,495 list). We've also excluded Microsoft Usage Analyst, formerly available as Interse's Market Focus 3; since it's now built into BackOffice, it's no longer a standalone product.

The Summary of Features table lists features to keep in mind when you're evaluating a site measurement package. Your specific needs are the real issue, as you may not require support for such features as cookies or virtual servers or for analysis of multigigabyte log files. As always with Internet software, the best way to tell what's right for you is to visit the company's Web site and download the trial package or—as you can with most of the products discussed here—visit the online demo.

Neil Randall is a frequent contributor to PC Magazine.

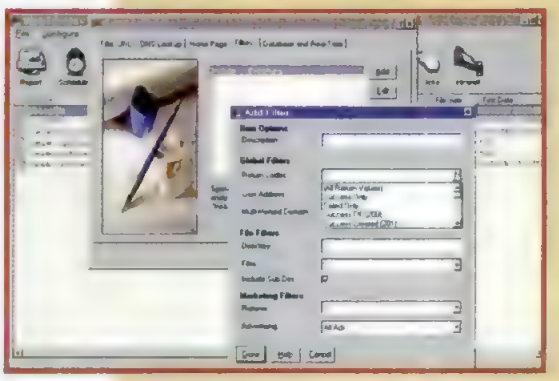
numbers for impressions and click-throughs are hyperlinked. If an ad shows 455 click-throughs, you can click on the hyperlinked 455 and receive a report showing precisely who performed those click-throughs. And each of those offers drill-down links as well.

You can build customized reports that let you include or exclude pages, hosts, and other details, and you can tell NetTracker to construct graphs to display the information in line, pie, bar, or 3-D format. All the reporting is done through Java, and all of it is surprisingly fast. For a good, quick look at your server's data and the ability to dig as deeply as you want into the details, NetTracker 3.0 Professional is a solid bet.

NetTracker 3.0. List price: Standard, $295; Professional, $495; Enterprise, $995 to $4,995. Sane Solutions, Wickford, RI; 401-295-4809; fax, 401-295-4154; www.sane.com. *Circle 489 on reader service card.*

WebTrends

With the first version of WebTrends, e.g. Software declared itself as one of the pioneers in Web analysis software, and their experience is apparent throughout the latest version of this package. Setup of WebTrends 3.5 is quick and painless, with the software locating your server software and log files automatically. Once it's in place, WebTrends lets you scan your server statistics almost immediately, working in the background to compile the information it needs.



WebTrends' filtering system lets you determine the specific elements to be reported in several categories.

Previous versions of WebTrends didn't use the database method, analyzing log files exclusively. Version 3.5 adds database technology called FastTrends to the package, and unlike most database-driven packages, it doesn't require lengthy initial importing of log files into its database format. Instead it creates its first reports on the fly as the log files are being read in, a time-saver as you're learning your way around the program. As with all the products discussed here, however, the first reports do take a considerable amount of time to generate.

WebTrends can handle huge server activity: The company claims 4GB log files and 40 million hits per day (our testing came nowhere near that, but the product performed flawlessly no matter what it was fed). WebTrends handles reports across virtual servers and clustered servers, and it can read directly from files in ZIP or GZIP format to minimize download time. Hits can be filtered to include or exclude various portions of DNS names, plus specific HTTP codes and file types, in order to keep the database to a reasonable size. You can measure responses from ads by filtering on the referring URL, and you can define specific groups of users and addresses for intranet reporting.

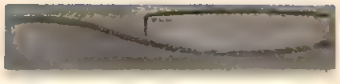
WebTrends works primarily on server log files, but Version 3.5 includes plug-ins for the Microsoft and Netscape server APIs that allow you to capture cookie information, referring sites, browser identity, and user details. The APIs also let you compress log files automatically. Reports can be generated in a variety of formats, including Microsoft Word and Excel. The software ships with more than 30 report templates and almost 200 graphing options, including 30 built-in graphs that show a wide variety of information.

WebTrends makes reporting almost effortless, but future versions will need to focus on more extensive reporting customization. Reports are detailed, but specific information is difficult to pin down, although with Version 3.5, this aspect is certainly improving. WebTrends is a very good all-purpose Web analyzer at the log file and API levels, and it comes at a very reasonable price.

WebTrends 3.5. List price: $299. e.g. Software Inc., Portland, OR; 503-294-7025; fax, 503-294-7130; www.webtrends.com. *Circle 490 on reader service card.*

Management's demanding Internet access for your entire organization. Now.

Adapt to it.



BAYSTACK™
INSTANT INTERNET™

REASON No. 1

Installed in less than 30 minutes

REASON No. 2

One IP address

REASON No. 3

Bulletproof firewall security

REASON No. 4

Full control of user access

Today, reality demands you get your LANs connected to the Internet. With Bay Networks Adaptive Networking, getting that done is not such a demanding task.

BayStack Instant Internet easily and safely connects your LAN to the Internet giving you smart, foolproof Internet access, in less than 30 minutes. One IP address. No additional hardware or software. No reconfiguration of the network. No endless tinkering.

You simply connect the Instant Internet hardware to your existing LAN and with zero downtime you have up to 100 PCs online. Need more? Just add another box. And because it's all through one IP address, you'll enjoy long-term cost and control advantages.

Is it for real? Well, it wasn't named Product of the Year by PC Magazine because it looks good on paper.

To obtain our "5 Quick Steps to the Internet" guide, visit our Web site at www.baynetworks.com/instantinternet/pm or call us at 1-800-8-BAYNET ext. 355 and start adapting.

Bay Networks

"5 Quick Steps to the Internet"

www.baynetworks.com/instantinternet/pm

FREE GUIDE

1.800.8.BAYNET ext. 355

© 1997 Bay Networks, Inc. BayStack and Instant Internet are registered trademarks of Bay Networks, Inc. All other trademarks are the property of their respective holders.

CIRCLE 186 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Installing OS/2 Remotely Over a Network

It takes a bit of work up front, but it makes later support much simpler.

By Brian Proffit

Since OS/2 Warp 4.0 includes so many new disk space–consuming features and device drivers, IBM decided to ship the product only on CD-ROM. But at least four situations exist in which you might not want to install OS/2 from the CD:

- You want to install OS/2 on a laptop or other system that doesn't have a CD-ROM drive;
- you want to install OS/2 on a client system in a remote location and don't want to ship your CD to that site;
- you want to install OS/2 on a remote system and no one at the remote location is capable of performing the installation;
- you want to install identical configurations of OS/2 on multiple systems.

Fortunately, IBM has provided ways to install OS/2 across a network. And by predefining the configuration, you can make the process automatic and easily repeatable.

INSTALLATION REQUIREMENTS

Your host system must have either Warp 4 Workstation or Warp Server running. The host and remote systems must have LAN adapter cards supported by Warp 4 and must be connected to each other. (Remote installation is possible with earlier versions of OS/2, but the steps will differ. This article assumes you are installing OS/2 Warp 4.) You will need three blank floppy disks for start-up disks to boot the remote system and begin installation.

Next you must decide how much, if any, the operator of the remote system can or must decide during the installation. If you want the remote operator to do as little as possible, you skip ahead to the section titled "Automated Installation."

GETTING READY TO INSTALL

The first steps in the installation process take place on the host system. On the Warp 4 CD-ROM, open the OS/2 System folder, the System Setup folder within it, and the Install/Remove folder within that. In the Install/Remove folder, double-click on the Remote Install icon. If you have already created remote installation disks, you'll be given the option of skipping that step.

In order to create the setup disks, the program needs to know what network adapter is installed in the system you will be installing onto, as shown in Figure 1. You can force the configuration of the network adapter to a particular IRQ, I/O address, and network adapter address by clicking on the Settings button in this dialog. That shouldn't be necessary, unless the adapter is conflicting with something else in the system or unless it is a PC Card modem. If the remote system is a laptop, click on the PCMCIA Support box and select the laptop type from the list. You are then prompted, one by one, to insert the three blank floppy disks to create the setup disks. Don't be surprised when the program asks you to reinsert a previous disk.

When you've created the start-up disks—or if you choose to skip the step—you will be instructed to use the disks to boot the remote system. Click Next and the host will be ready to proceed, as shown in Figure 2. The host system must be at this point before remote installation can begin.

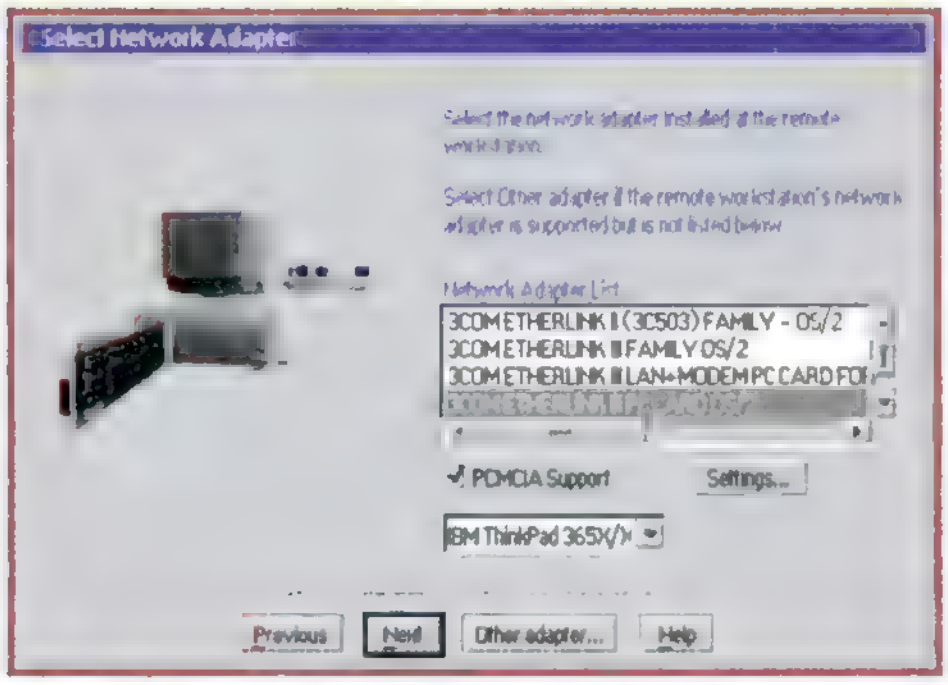


FIGURE 1: *A driver for the remote system's network adapter is put on the setup disks.*

INSTALLING AT THE REMOTE

Make sure the Warp CD-ROM is in the host system's drive. The remote system is installed from the CD, not from the host's hard disk. Then boot the remote system using the setup disks you've created. The device driver for the remote system's network adapter should load automatically. If it doesn't, you can examine the file lantran.log on Setup Disk 2 for details of the process. If you have problems, make sure you selected the correct network adapter, that the IRQ and I/O address in protocol.ini on Disk 2 are correct, and that the host system is at the point shown in Figure 2.

During the initialization process, the remote system should link with the host and map the host's CD-ROM as drive Z:. From that point, the installation continues as if the CD were loaded in the remote computer.

The process can be simplified somewhat if you want the remote system to have the same network abilities as the host. On the host system, open an OS/2 command prompt and type *\ibminst\npconfig /rsp*. This will create a file on the host called npconfig.cfg, in the directory \ibminst\rsp\remote. When the installation program sees that file, it will ask the remote user whether he would like to use the file.

Note, though, that you may need to edit npconfig.cfg before use. The file contains references to the OS/2 boot drive and the network adapter driver, both of which may be different on the remote system.

AUTOMATED INSTALLATION

Suppose you have a nontechnical user at the remote location, or you want to set up several systems that are exactly alike. If you're willing to work at it, you can configure the host system as a code server, from which the remote user can install OS/2 with no responsibilities other than shuffling three disks. This technique uses the LAN Configuration, Installation, & Distribution (CID) utility that comes with Warp.

During installation, the remote needs to access the OS/2 disk images from the CD. The most straightforward method is to copy them onto your code server's hard disk. You should employ the XCOPY command shown below to create the directory \cid, with subdirectories \client, \locinstu, \rsp\warp, \exe\warp, \dll\warp, \img\warp, \img\srvifs, and \img\mpts. In this article, we will assume that OS/2 is on the code server's drive K:, you are putting the CID files on drive M:, and the CD-ROM is drive N:. With the Warp CD-ROM loaded, open an OS/2 command prompt and type:

```
XCOPY N:\OS2IMAGE\* M:\CID\IMG\WARP /S
```

The disk images are in packed form, and a few files must be extracted for use by the remote system. You can extract the needed files with the following commands:

```
XCOPY N:\CID\SRVIFS\*
M:\CID\IMG\SRVIFS
XCOPY N:\CID\IMG\MPTS\*
M:\CID\IMG\MPTS /S
XCOPY N:\CID\LOCINSTU\*
M:\CID\LOCINSTU
M:\CID\LOCINSTU\GETOSCID M:\CID\
IMG\WARP M:\CID\EXE\WARP
M:\CID\LOCINSTU\GETBOOT M:\CID\
IMG\WARP M:\CID\EXE\WARP M:\CID\
LOCINSTU\GETREXX M:\CID\IMG\WARP
M:\CID\DLL\WARP
```

Next you must create a configuration file for the server. Save it as M:\cid\img\srvifs\cidsrv.ini. The following sample will suffice for simple installations. It identifies the NetBIOS name for the server, specifies that this is the only code server on the LAN, gives the path to the CID files, and specifies that drive as read-only:

```
Name = CIDSRV
GroupName = NO
Path = M:\CID
PermitWrite = NO
```

For more detailed information on this configuration file and all aspects of CID installation, see the LAN CID Utility Guide in N:\cid\img\mpts\utility\pubs\pubs.zip. Now register this configuration file and modify the server's configuration by running the following command:

```
N:\CID\SRVIFS\THINSRV/S:M:\CID\IMG\
SRVIFS /R:M:\CID\IMG\SRVIFS\
CIDSRV.INI /TU:K:
```

If you will be doing a remote installation right away, you should run startup.cmd manually now to start the service program. Otherwise, it will begin automatically the next time you boot the code server.

CREATING A RESPONSE FILE

In order for the installation to proceed without requiring (or allowing) the remote user to answer configuration questions, you must answer them all in advance and put the information into a response file. Unfortunately, no user-friendly graphical method exists for creating a response script, but you can start with:

```
COPY N:\SAMPLE.RSP
M:\CID\RSP\WARP\DEFAULT.RSP
```

This file contains a complete set of parameters available for configuring OS/2 installation. Fortunately, it's thoroughly commented, because a complete description of the parameters and their options would take another article. It is even possible to configure automatic installation of the additional programs in the BonusPak. You can specify additional device drivers to be installed and programs to be launched automatically when the installation is complete.

Using your favorite text editor, load default.rsp and set all the parameters as needed for the remote installation. The keyword IncludeInLine lets you set up a response file for each client. The default response file would contain the normal installation information, but if one client has a different model CD-ROM drive, you could set up a response file with the lines:

```
IncludeInLine = X:\RSP\WARP\
DEFAULT.RSP
CD-ROM=65
```

(The X: is correct. When the remote system is booted using CID, the code server's directory M:\cid is accessed as drive X:.) Create a subdirectory under your main directory, and give it the client's NetBIOS name. That directory will be detected automatically during installation, and the system will be configured with all the standard options, with the exception of the CD-ROM drive.

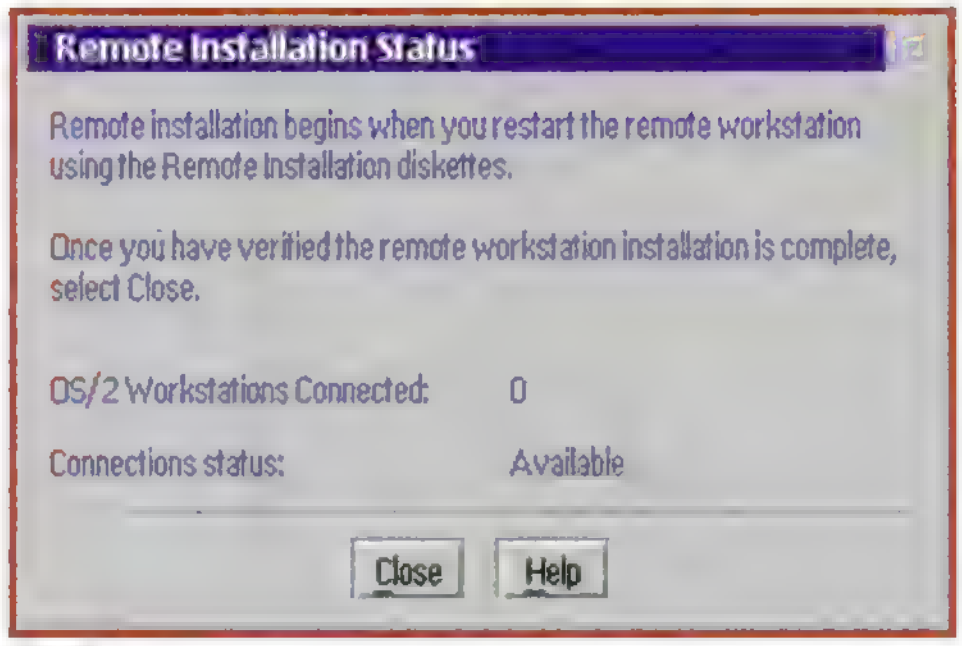


FIGURE 2: *The remote installation program on the host acts as an installation server.*

CREATING AN INSTALLATION COMMAND FILE

Next you must set up the command file that will run the installation procedure. The remote will call this procedure as soon as it attaches to the host. First, copy the skeleton program provided by IBM:

```
COPY M:\CID\LOCINSTU\CASSKEL.CMD
M:\CID\CLIENT\DEFAULT.CMD
```

Default.cmd has several lines that you will have to tailor to your configuration, so load it into your text editor. Find the following statements:

```
bootdrive='C:'
exepath = 'X:\EXE\V210'
dllpath = 'X:\DLL\V210'
os2dir = 'V210'
```

Change the first path to point to the drive from which the remote system should boot and the others to point to the Warp files on your code server, in this case X:\exe\warp, X:\dll\warp, and warp. Now go to the line:

```
/srv:server1
```

Change `server1` to `CIDSRV` and save the file.

CREATING SETUP DISKS

Now you must create the setup disks for the remote system. If the remote system requires PCMCIA support, you will need to determine that system's PCMCIA identification number before running the disk creation program. Browse the file sample .rsp again, and do a search on PCMCIA to get to the table of ID numbers. For example, an IBM ThinkPad 365 has a PCMCIA ID of 19. Locate three formatted disks; label them Setup Disk 0, 1, and 2; and enter the following command (if the remote system doesn't need PCMCIA support, leave off the third parameter) to create the disks in the A: drive:

```
M:\CID\EXE\WARP\SEDISK
/S:N:\OS2IMAGE /T:A: /P:19
```

Next you need to copy the drivers for the remote system's network adapter to the disks. Browse the table found in K:\ibmcom\macs\readmac.txt for the name of the network information file (.nif) that corresponds to the remote's network card. With Setup Disk 2 still in the drive, issue the following command, using the filename that you found in the table:

```
M:\CID\IMG\MPTS\THINLAPS
N:\CID\IMG\MPTS A:\ your_nif.nif
```

After copying several files, you will be asked to switch to Setup Disk 1 so the file config.sys can be updated to load the drivers. Next you'll need to copy the modules that redirect

$495.00
$195.00*
(wish granted.)

Why is the Web full of so much voodoo?

Why is it so strangely impossible to get things to look the way you want them to?

Why is it so hard to get a site up and running?

And then why must you endure so many contortions when you want to make changes to that site (including, for instance, having to remember what was linked to what)?

For those of you who have better things to do, may we suggest NetObjects Fusion.™

It demystifies the Web. Finally, you can easily design your site. Build it. Update it. So, go do good work.** The Web needs you.

1-800-328-2521, dept. 9KBA

www.netobjects.com/voodoo/pcmagazine

*Price after rebate, assumed purchase price of $295 less $100 Competitive Upgrade Rebate. To qualify you must purchase NetObjects Fusion between 8/11/97 and 10/31/97, and own one of the following products: Microsoft FrontPage, Adobe PageMill, Adobe SiteMill, Claris HomePage, SoftQuad HoTMetaL PRO, GoLive CyberStudio, Symantec Visual Page or DeltaPoint QuickSite. For full details on this rebate refer to the Competitive Upgrade Certificate on the product package or visit our Web site at www.netobjects.com

**Of course, NetObjects Fusion runs on Mac OS and Windows computers.

©1997 NetObjects, Inc. All rights reserved. NetObjects, NetObjects Fusion, and the NetObjects logo are trademarks of NetObjects, Inc. "The Web needs you" is a service mark of NetObjects, Inc. Other brand names may be trademarks of their respective companies.

NETObjects™

CIRCLE 149 ON READER SERVICE CARD

BONNIE BLAIR: SPEED SKATER, SPEED SURFER

For mind-blowing speed on the Internet, Bonnie goes with the gold medal performance of MindSpring. Its fast, reliable access takes her direct to the Internet. No delays. No detours. No false starts.

So, exercise your options and get a speedy, easy-to-use MindSpring Internet connection. You'll get a software suite with a top-rated browser, great e-mail, newsgroups and more. MindSpring–the fast, reliable Internet service provider that's heads-above the crowd.

With MindSpring you get:

- Flexible pricing – from as low as $6.95 to $19.95 a month for unlimited access
- Free software for Mac or Windows – Call **1-888-M-SPRING**
- Free Web space with most plans – 5 to 10 MB
- Free 24-hour technical support
- And, a no risk, 30-day money back guarantee

MindSpring™

Direct To The Internet.

www.mindspring.com

Now it's easy to create your personal Web page with HotDog Express™, the top-rated Web page software.

Call today to receive your FREE HotDog Express Software* a $49.95 value.

1-888-M-SPRING

(1-888-677-7464)

No risk, 30-day money back guarantee. Hurry, offer expires October 31, 1997.

*Available only with select usage plans

PC WORLD BEST BUY | PC MAGAZINE | Netscape Ambassador Winner | U.S. Robotics 2 56Kbps modem

© 1997 MindSpring Enterprises, Inc. All other names are trademarks or registered trademarks of their respective holders.

Bonnie Blair, Gold Medal Speed Skater

CIRCLE 089 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

installation from the remote to the code server and provide the remote and code-server names for the connection. Reload Setup Disk 2 and type the following command:

```
M:\CID\IMG\SRVIFS\THINIFS/S:M:\CID
\IMG\SRVIFS /T:A: /SRV:CIDSRV
/REQ:*/D:X:
```

Again, after some updates you will be asked to switch to Setup Disk 1, so that config.sys can be updated. Next you need to create the start-up routines to begin the remote installation. Type the following command:

```
M:\CID\LOCINSTU\CASINSTL /TU:A:
/CMD:X:\CLIENT /PL:X:\DLL\WARP;
X:\LOCINSTU /PA:X:\LOCINSTU /D /@
```

Because the driver support on the setup disks is minimal, you may need to edit the file protocol.ini on Disk 2 and add an IRQ and I/O address, even if these would be detected automatically by the PC Card Services once OS/2 is installed.

Setting up a remote installation may be a lot of work, but once it's done it can greatly simplify the work of an IS support department.

INSTALLING THE REMOTE SYSTEM

Because you've already done so much in preparation, this part couldn't be easier. Insert the installation disk and boot the remote system. The user will be prompted to change disks, but no more action should be required until the installation is complete.

Although setting up a remote installation may appear to be a lot of work, the work load of an IS support department can be greatly simplified by doing it once and using the setup for all subsequent installations. Not only will the installation go more smoothly, but later support will be simpler, because you can be sure every user is working from the same configuration base.

Brian Proffit is a contributing editor of Computing Today *and the author of* OS/2 Warp Survival Kit.

ZD ZIFF DAVIS

BOOKMARK

Bench the benchmark.

PC MAGAZINE ONLINE

www.pcmag.com

COMMUNICATE!

All-in-One Fax, Voice, Data, E-mail and Contact Management Software

AnyWay • AnyOne • AnyWhere

COMMUNICATE! is a completely integrated Fax, Voice/Telephony, E-mail and Data Communications software package for Windows. It seamlessly integrates a Contact Manager, Graphics Editor and OCR capabilities under one program icon while using a very familiar telephone/answering machine interface. COMMUNICATE! is the most comprehensive and easy-to-use communications software package available for small business, home office and mobile users.

COMMUNICATE! is as simple to install as 'point and click' and works on any Windows-based PC.

All-in-One Software

Fax	Send, receive, broadcast and fax-on-demand
Voice	Fully featured voice mail system with broadcast capability
Data	Connect to a BBS, and transfer files with other systems
E-mail	Send, receive and broadcast Internet e-mail
OCR	Convert fax images to text
Contact Management	Powerful database searches and unlimited address books

Available for Windows NT, 95 and 3.1!

01 COMMUNIQUE LABORATORY INC.

POINT

Click **COMMUNICATE!™**

Click **Send a fax!**

Click **Check your phone messages!**

Click **Send Internet e-mail!**

Click **Manage your contact list!**

Now Only $109

~~$139~~

ESTIMATED STREET PRICE

To utilize voice features, a fax/data/voice modem with speaker phone capability is required. Contact us for information on compatible modems.

Toll Free: 1-800-668-2185 • **Tel:** 1-905-795-2888 • **Fax:** 1-905-795-0101 • **Internet:** http://www.01com.com

COMPUTER City · Fry's ELECTRONICS · MICRO CENTER THE COMPUTER DEPARTMENT STORE · Office DEPOT · OfficeMax We Go To The Max For You!

CIRCLE 134 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Building Automation Hierarchies with MFC, Part 1

A sample project shows you how to build an Automation server that uses a hierarchical object model.

By Jeff Prosise

Writing a world-class application is no longer just a matter of producing the best feature set on the planet. The truly great applications use ActiveX Automation to expose their innermost secrets to the outside world. Some of the best in-house applications being written today are Visual Basic or Visual Basic for Applications (VB/VBA) programs that use Automation server applications such as Microsoft Excel and Internet Explorer to do their bidding. That's the whole point of Automation: It's a way for any developer to make his or her product a potent weapon in the hands of other programmers.

Writing an Automation server used to be a complex, time-consuming undertaking. Thankfully, that's no longer the case. Together with the code-generating abilities of Visual C++, MFC makes Automation a snap. You start by checking the Automation box in AppWizard. Then you use ClassWizard to add Automation properties and methods. Before you know it, you have a working Automation server. If you've ever written an Automation server without a class library, you can appreciate just how much easier MFC makes it.

MFC simplifies the job, but there's a catch. When AppWizard creates code for an Automation server, it automates only the document class. Unless you add other automatable classes, all Automation properties and methods must belong to the document class. That's fine for simple Automation servers, but for complex servers containing dozens or even hundreds of properties and methods, it's like funneling rush-hour freeway traffic onto a one-lane bridge.

That's why Excel and other Office apps employ hierarchical object models like the one pictured in Figure 1. To start Excel and disable its AutoCorrect feature Correct Two Initial Capitals (the one that tells Excel to replace two capital letters at the beginning of a word with a capital followed by a lowercase character), a VB/VBA programmer might write

```
Application.AutoCorrect
  .TwoInitialCaps = False
```

In this example, `Application` is an object that represents Excel itself, `AutoCorrect` is a subobject representing Excel's AutoCorrect feature set, and `TwoInitialCaps` is a property of the `AutoCorrect` object. Exposing `AutoCorrect` as a property of the top-level `Application` object makes programming more intuitive and lends organization to Excel's Automation interface. It wouldn't be much of an object model if it had just one big object weighed down with hundreds of properties and methods.

How does one go from AppWizard's flat, document-based object model to a hierarchically structured object model like Excel's? By using an Automation hierarchy. In such a hierarchy, certain objects are exposed as "creatable" objects—that is, they can be created with VB/VBA statements such as the following:

```
Dim App as Object
Set App = CreateObject("SomeApp
.Application")
```

Other objects, like the `Window` object in the following statement, can't be created directly but must be accessed as properties of a higher-level object:

```
App.Window.Visible = 1
```

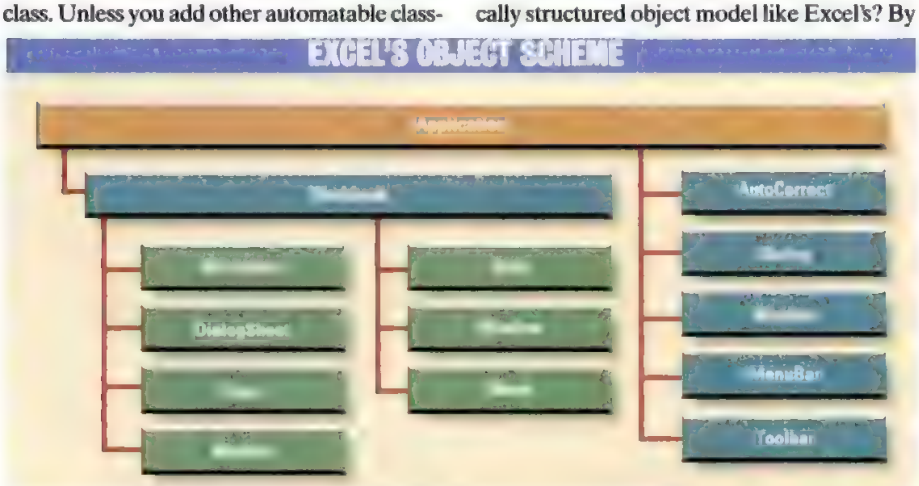


FIGURE 1: *A partial schematic of Excel's object model.*

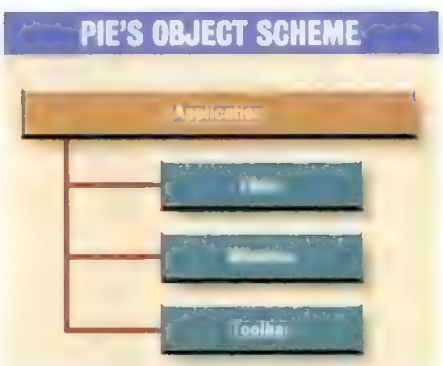


FIGURE 2: *The Pie application.*

The secret to implementing Automation hierarchies is in knowing how to expose one object as a subobject of another. Since hands-on experience is the best teacher, let's build an MFC application that implements a two-level Automation hierarchy. Once you understand the mechanics, you'll be able to create more sophisticated Automation hierarchies with ease.

THE PIE APPLICATION

The sample application we'll develop is Pie, an SDI document/view application whose output is a colorful pie chart depicting four quarterly revenue values. It's also an Automation server that uses the hierarchical object model shown in Figure 2. Once Pie is built and registered as an Automation server, a VB/VBA script like this one may be used to launch it, add quarterly revenues, and draw a pie chart:

```
Dim Pie as Object
Set Pie = CreateObject("Pie
.Application")
Pie.Window.Visible = 1
Pie.Chart.QRev(1) = 100
Pie.Chart.QRev(2) = 200
Pie.Chart.QRev(3) = 300
Pie.Chart.QRev(4) = 400
Pie.Window.Refresh
```

ON OCTOBER 10TH ONE PRODUCT IS GOING TO CONNECT EVERY VIDEO CLIENT IN THE WORLD.*

MEETINGPOINT CONNECTS EVERYONE

REGARDLESS OF WHAT SOFTWARE OR SPEED THEY USE TO CONNECT TO THE INTERNET.

Now you can videoconference with a friend across the street or hundreds of people around the globe. Instantly invite colleagues to productive video meetings right over the Internet, any time, day or night, for just pennies per minute. For a demonstration of this revolutionary new product, ask your Internet Service Provider to schedule a or visit for a growing list of providers, and free CU-SeeMe software.

MeetingPoint™

*any H.323 compatible client.

PictureTel is a registered trademark of PictureTel Corporation. Intel is a registered trademark of Intel Corporation. Microsoft is a registered trademark of the Microsoft Corporation. Other product names may be the trademarks of their respective owners

CIRCLE 192 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Speed is not the only matter

Compatibility

AmbiCom's concern is also

1-888-AMB-3933

Call now to get an evaluation unit for just $79

AmbiCom meets customers' needs—besides AMB8100's **high speed performance,** you can use it in every CardBus notebook; it introduces you to AmbiCom's convenient, reliable, and affordable **32-bit 10/100 BASE-TX** Ethernet CardBus PC Card-**AMB8100**. AMB8100's **pocket-sized** design makes it convenient to carry and easy to use; its **auto-sensing** with **automatic configuration** makes installation a breeze. AMB8100 supports complete drivers with full duplex capability, which improve overall network **performance and compatibility**. No matter what kind of CardBus notebooks you use, AmbiCom's AMB8100 satisfies all!

COMDEX Fall '97 See at Booth C8516

© 1997 AmbiCom, Inc. All rights reserved. All trademarks are registered trademarks of their respective companies.

AmbiCom

CIRCLE 093 ON READER SERVICE CARD

Frustrated by Windows problems? Get First Aid. It fixes more Windows problems more automatically than any other software on the market today. So why get frustrated? Get First Aid.

Pick up a copy today at your local retailer, or call 1.800.841.3539 ext. 18 to order direct.
To download a free trial copy, visit our website at www.cybermedia.com/pc2

CYBERMEDIA®
MORE POWER TO YOU™

CIRCLE 294 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

PIE'S OBJECTS: PROPERTIES AND METHODS

Object	Property or method	Type	Arguments	Description
Application	Quit (method)	Void	None	Quits the application.
	Chart (property)	Object	None	References the Chart object.
	Window (property)	Object	None	References the Window object.
	Toolbar (property)	Object	None	References the Toolbar object.
Chart	Save (method)	Boolean	String	Saves the chart to disk.
	QRev (property)	Short	Integer	Sets or retrieves a quarterly revenue value.
Window	Refresh (method)	Void	None	Refreshes the window to reflect the latest quarterly revenues.
	Visible (property)	Boolean	None	Shows or hides the window.
Toolbar	Visible (property)	Boolean	None	Shows or hides the toolbar.

FIGURE 3: *The Advanced Options dialog.*

The first tier of Pie's object hierarchy has one object: a creatable object whose Automation name, or type ID, is `Pie.Application`. We'll refer to it as the `Application` object. The second tier has three objects: `Chart`, the pie chart; `Window`, the window in which the pie chart appears; and `Toolbar`, the application's toolbar. These objects are exposed as properties of the `Application` object. Figure 3 lists each object's Automation properties and methods. Together, they define Pie's Automation interface.

How hard is it to write an application like Pie? It's easy as pie, if you use Visual C++. But the source code alone isn't enough to show you how. Building an MFC Automation server is a highly interactive process involving extensive use of the wizards, especially ClassWizard. (Sure, you could write all the code by hand. You could write the whole thing in assembly language, too. Not fun!) For that reason, I'll describe not just the source code but all the steps required to create it.

In this article, we'll get Pie up and running as a standalone application. In Part 2, we'll transform Pie into an Automation server and implement the object model. If you can't wait to see the finished product, the complete source code is available now from PC Magazine Online (*www.pcmag.com*). Look in the PC Tech Archive file for Piefiles.exe, which is a self-extracting compressed file.

If you're an experienced Visual C++ programmer and have written MFC Automation servers before, you should find my instructions easy to follow. If you're new to Visual C++, I'd suggest going through the AutoClick tutorial on the Visual C++ CD first. AutoClick will teach you such fundamental skills as adding an Automation property or method with ClassWizard. These skills should be second nature to you before you try to create an Automation server complex enough to warrant an object hierarchy.

BUILDING THE APPLICATION

A good place to begin the project is using AppWizard to generate an application skeleton. Here are the steps. I did my building and testing with Visual C++ 5.0, but the same process will work in Version 4.

1. Create a new MFC AppWizard (exe) project named Pie.

2. In AppWizard's Step 1 dialog, select "Single document."

3. In AppWizard's Step 3 dialog, check the Automation box and uncheck ActiveX Controls. (We won't use any ActiveX controls in this application.)

```
int CPieDoc::GetRevenue (int nQuarter)
{
    int nResult = -1;
    if ((nQuarter >= 0) && (nQuarter <= 3))
        nResult = m_nRevenues[nQuarter];
    return nResult;
}

void CPieDoc::SetRevenue(int nQuarter, int nValue)
{
    if ((nQuarter >= 0) && (nQuarter <= 3)) {
        m_nRevenues[nQuarter] = nValue;
        SetModifiedFlag ();
    }
}
```

FIGURE 4: *The document's GetRevenue and SetRevenue functions.*

4. In AppWizard's Step 4 dialog, click the Advanced button, enter *pie* in the filename extension box, and change Pie.Document to Pie.Application.

5. Dismiss the dialog, click Finish, and let AppWizard do its thing.

Bookmark these 100 sites

http://www.zdnet.com
ZD Net Home Page

PC MAGAZINE
http://www.pcmag.com
PC Magazine Site

Come see the hottest destinations for computer buying information on the World Wide Web.

ZDNet™
World Wide Web Edition

Come see what we did with 2 more inches.

refresh rate

sony+25%=EO90

sony 17sell $899 esp

$849 esp

physical pixels

viewsonic+68%=EO90

viewsonic pt775 $899 esp

$849 esp

display area

nec+34%=EO90

nec p750 $899 esp

$849 esp

19

The big plus = big value.

The big plus in monitors is here. Keeping our tradition of bringing more performance for less money Princeton Graphic Systems brings you the EO90. The EO90 delivers more monitor for your money. More physical pixels than Viewsonic's pt775, more windows space than NEC's p750 and faster refresh rates than Sony's 17sell. And all of this for a lower price!

Experience the EO90's sizeable performance first-hand. Visit your nearest Princeton Ultimate Reseller for a demonstration – and see a whole new dimension in monitors.

©Princeton Graphic Systems. All rights reserved. All trademarks are the properties of their respective owners. As an Energy Star℠ Partner, Princeton Graphic Systems has determined these products meet Energy Star℠ guidelines for energy efficiency. Prices and specifications are subject to change without notice. Estimated street price shown. Actual price may vary. Full three-year limited warranty is offered on the P900. Competitor's prices and specifications based on information in their respective web sites as of July 1, 1997.

CIRCLE 031 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

```
void CPieView::OnDraw(CDC* pDC)
{
   CPieDoc* pDoc = GetDocument();
   ASSERT_VALID(pDoc);

   //
   // Initialize the device context.
   //
   CRect rect;
   GetClientRect (&rect);
   pDC->SetMapMode (MM_ANISOTROPIC);
   pDC->SetWindowExt (500, 500);
   pDC->SetWindowOrg (-250, -250);
   pDC->SetViewportExt (rect.Width (), rect.Height ());

   //
   // Create a set of brushes.
   //
   CBrush brFillColor[4];
   brFillColor[0].CreateSolidBrush (RGB (255,   0,   0));
   // Red
   brFillColor[1].CreateSolidBrush (RGB (255, 255,   0));
   // Yellow
   brFillColor[2].CreateSolidBrush (RGB (255,   0, 255));
   // Magenta
   brFillColor[3].CreateSolidBrush (RGB (  0, 255, 255));
   // Cyan

   //
   // Draw the pie chart.
   //
   int nTotal = 0;
   for (int i=0; i<4; i++)
      nTotal += pDoc->GetRevenue (i);

   int x1 = 0;
   int y1 = -1000;
   int nSum = 0;

   for (i=0; i<4; i++) {
      int nRevenue = pDoc->GetRevenue (i);
      if (nRevenue != 0) {
         nSum += nRevenue;
         int x2 = (int) (sin ((((double) nSum * 2 *
         PI) /
              (double) nTotal) + PI) * 1000);
          int y2 = (int) (cos ((((double) nSum * 2 *
          PI) /
             (double) nTotal) + PI) * 1000);
         pDC->SelectObject (&brFillColor[i]);
         pDC->Pie (-200, -200, 200, 200, x1, y1, x2,
         y2);
         x1 = x2;
         y1 = y2;
      }
   }
   pDC->SelectStockObject (WHITE_BRUSH);
}
```

FIGURE 5: *The view's OnDraw function.*

The next procedure is to add a basic infrastructure to the document and the view. First we'll add a member variable to the document class to store quarterly revenue values and member functions for setting and retrieving those values. Next, we'll modify the view's `OnDraw` function to draw the pie chart. Then we'll implement the document's `Serialize` function to facilitate document saving and loading. Here's a blow-by-blow:

1. Add an array of four `int`s named `m_nRevenues` to the document class. Make the array a protected member variable so it can't be accessed from outside the document class.

2. Add the following statements to the document's `OnNewDocument` function to initialize the quarterly revenue values (the values given are random):

```
m_nRevenues[0] = 164;
m_nRevenues[1] = 96;
m_nRevenues[2] = 208;
m_nRevenues[3] = 132;
```

3. Add a public member function named `GetRevenue` to the document class. Have it accept an `int` named `nQuarter` and return an `int` to the caller. Implement the function as shown in Figure 4.

4. Add a public member function named `SetRevenue` to the document class. Its implementation is also shown in Figure 4.

5. Add the following statement to the view's .cpp file, after the directive `#include Stdafx.h`:

```
#include <math.h>
```

6. Add the following `#define` directive to the view's .h or .cpp file:

```
#define PI 3.1415926
```

7. Edit the view's `OnDraw` function to look like Figure 5.

8. Edit the document's `Serialize` function to look like Figure 6.

Now build the application and run it. If all has gone well, you should see a pie chart. If you'd like, you can add a dialog box that lets a user edit the quarterly revenue values stored in the document's `m_nRevenues` array. I won't do that here, since the point of the exercise is to let revenue values be changed through Automation.

NEXT UP: AUTOMATION

Next time around, we'll transform Pie into a full-blown Automation server, complete with a hierarchical object model. The fun is just beginning! PC

Jeff Prosise is a contributing editor of PC Magazine.

```
void CPieDoc::Serialize(CArchive& ar)
{
    if (ar.IsStoring())
    {
        for (int i=0; i<4; i++)
            ar << m_nRevenues[i];
    }
    else
    {
        for (int i=0; i<4; i++)
            ar >> m_nRevenues[i];
    }
}
```

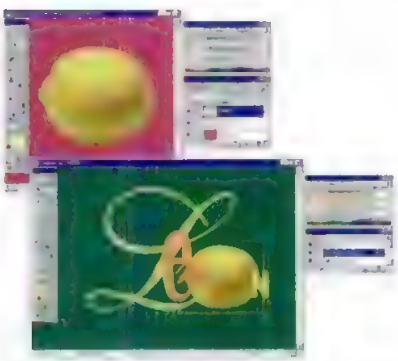
FIGURE 6: *The document's Serialize function.*

BUY NOW AND GET GRAPHICS • PLUG-INS LEARNING CD's IN THE BOX @ www.adobe.com/actionpack/print.html

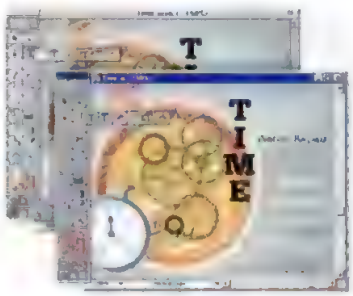
NEW ADOBE® ILLUSTRATOR® 7.0 *for* WINDOWS®

PICTURE THE POSSIBILITIES

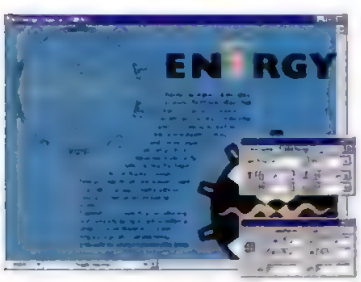
NO JOB IS TOO BIG OR TOO SMALL. From the simplest graphics to the most complex artwork, new Adobe Illustrator 7.0 for Windows handles just about all your illustration jobs.



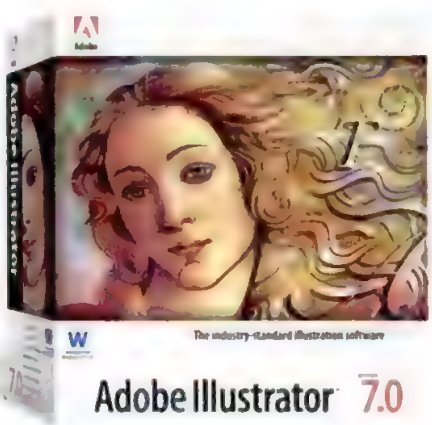
WORKS SEAMLESSLY WITH ADOBE PHOTOSHOP® and Adobe PageMaker® like no other illustration software. You learn and work faster, with the same user interface, including shortcuts and menus. Even drag & drop among all three programs.



WINDOWS AND MACINTOSH—SAME GREAT FEATURES. It's never been easier to share files across platforms with colleagues, clients and service bureaus.



PRECISE CONTROL OF ARTWORK AND TYPE. Create, transform and align elements just the way you want. Adjustable "snap-to" guides and grids make layout design easier. You can even wrap text around any shape or run type along any line.



UNMATCHED COMPATIBILITY. Input from anywhere, output for everywhere. Support for more than 20 image, graphics and text formats, including TIFF, WMF, CDR, PhotoCD,™ GIF89a and MS-Word—plus Adobe PostScript® printing, too.

AND TRY IT FREE.

Just look what's possible now that new Adobe Illustrator 7.0 for Windows is here. Experience first hand the amazing control and flexibility Adobe Illustrator offers graphics software users like you. Get your tryout version,* video guided tour & product brochure all on CD-ROM, ABSOLUTELY FREE. Just go to *www.adobe.com/illustrator/freecd* to get your FREE CD-ROM. Or buy new Adobe Illustrator 7.0 at your favorite place to get software, and get the Adobe ActionPack® CD set free.

Adobe

Free Adobe ActionPack with purchase of Adobe Illustrator, Photoshop or PageMaker. Offer good on new retail units only, while supplies last. Not valid on upgrades or volume licenses. *No purchase necessary. Offer good in the U.S. and Canada only, and only while supplies last or until 12/31/97. Please allow up to 8 weeks for delivery. CD-ROM contains video, product brochure and tryout versions. Tryout versions do not save or print. ©1997 Adobe Systems Incorporated. All rights reserved. Adobe, the Adobe logo, Illustrator, Photoshop, PageMaker, PostScript and ActionPack are trademarks of Adobe Systems Incorporated. Windows is either a registered trademark or trademark of Microsoft Corporation. Inc. Macintosh is a trademark of Apple Corporation, registered in the U.S. and other countries. PhotoCD is a trademark of Eastman Kodak. All other trademarks are the property of their respective owners.

CIRCLE 274 ON READER SERVICE CARD

100 REASONS WHY

COREL WordPerfect Suite 8 BEATS MICROSOFT OFFICE 97

Word Processor Features	Corel® WordPerfect® 8	Microsoft® Word 97
Support for Intel MMX™ Technology	✔	no
Libraries		
Clipart	10,000+	3,000+
Photos	250	140+
Interface		
Shadow Cursor	✔	no
Tile documents vertically	✔	no
Reveal Codes	✔	no
Save workspace	✔	no
Search for any codes	✔	no
Application bar	✔	no
Context-sensitive property bars	42	13
Internet*		
Automatic natural language hyperlinks	✔	no
Corel Barista™ (for Java™ publishing)	✔	no
Java applets	✔	no
Formatting Tools		
QuickFonts™ font preview	✔	no
Spell check drop cap words	✔	no
Guidelines	✔	no
Font preview from drop-down list	✔	no
Styles can include text and graphics	✔	no
User-defined borders and fills	✔	no
Image rotation	✔	no
Parallel columns	✔	no
Captions on any side of image	✔	above and below
Make It Fit™ to expand documents	✔	no
Customizable Make It Fit options across multiple pages	6	none
Undo levels	300	100
Multiple character drop caps	50	1
Tables		
Row and column indicators	✔	no
Automatic data fill (QuickFill™)	✔	no
Format painter tables	✔	no
Automatic calculation	✔	no
Formulas function across tables	✔	no
Number of formulas	99	18
Long Documents		
Create new table	✔	no
Expand/contract subdocuments individually	✔	no
Predefined document summary fields	51	27
Proofing Tools		
Combined Spell Checker/Thesaurus/Grammar	✔	no
Prompt-As-You-Go	✔	no
Document dictionaries and editable main dictionary	✔	no
Automatic sentence rewrite (PerfectSense™)	✔	no
SGML		
Import/export	✔	no
SGML editing and validation	✔	no
Document creation tools based on DTD	✔	no
Transitioning		
Backward compatibility	✔	no
Convert Corel WordPerfect for DOS macros	✔	no
Use existing Corel WordPerfect for Windows® macros	✔	no
Corel WordPerfect for DOS keyboards	✔	no
Convert Corel WordPerfect 6.x files	✔	import only

WYSIWYG editable view	✔	no
Cell reference checking	✔	no
QuickCell™	✔	no
Copy, cut, paste discontinuous ranges	✔	no
QuickCharacter™ insert	✔	no
Consolidation, budget and scenario experts	✔	no
Sort reuse list	✔	no
QuickType™ formulas	✔	no
Edit headers/footers onscreen	✔	no
WordPerfect (including tables) and Quicken	✔	no
Quattro® (WK0/WQ2)/Quattro Pro Notebooks (WB2, WB3) imports	✔	no
Formula Composer™	✔	function wizard
Fill-As-You-Go™ (no "#####")	✔	limited
Core @functions	594	400

Presentation Features	Corel® Presentations™ 8	Microsoft® PowerPoint® 97
Support for Intel MMX™ technology	✔	no
Publish to Java (Corel Barista)	✔	no
QuickKeys keystroke actions (such as go to another slide, launch an application, play a sound, or even link to a URL)	✔	no
Add multiple slides simultaneously	✔	no
Import outlines into organization charts	✔	no
Customizable Background Gallery	✔	no
Slide navigation tabs	✔	no
Chart styles	✔	no
Range Highlighter used in datasheet	✔	no
Sort pie slices	✔	no
Separate drawing mode	✔	no
QuickWarp objects	✔	no
Blend objects together	✔	no
Place/Resize/Rotate chart	✔	no (must separate into objects)
Gradient fill (text and objects)	✔	objects only
Quick 3D any image	✔	drawing objects only
Slide transitions	120	41
Data chart functions (equations)	16	7

Communication Features	Corel® CENTRAL™ 8†	Microsoft® Outlook 97
Create a "Planner" containing a calendar and multiple card files	✔	no
Built-in Mail Filters/Rules	✔	no
Add freeform notes to calendar	✔	no
Easily add custom fields to address book	✔	no
Schedule group events over the Internet	✔	no
Assign To Do items over the Internet	✔	no
Easily follow e-mail threads	✔	no
Compose content-rich HTML messages for assigned To Do items	✔	no
Type personal To Do items directly in list	✔	no
Use the Internet for long distance calls	✔	no
Edit address book entries in view mode	✔	no
Access Internet newsgroups and corporate discussion groups using mailbox interface	✔	no
Conduct and save a "live" chat session	✔	no
Click on hyperlinks to go to linked information	✔	no
Organize cards into groups	✔	no
Participate in collaborative Internet browsing	✔	no
Support for LDAP	✔	no
Surf the Internet using an integrated browser	✔	no
Create simple, flexible card files	✔	no
Link cards to documents or applications	✔	no
Have information "pushed" to you for instant access	✔	no

"WordPerfect . . . offers a wider selection of utilities in the box — and costs $200 less."

***PC Computing*, July 1997**

Available now! To buy Corel WordPerfect Suite 8, contact your local reseller.

Please visit our Web site for additional information.

*Internet connection required.

†CorelCENTRAL 8 is not included in this release of Corel WordPerfect Suite 8. Customers will receive a voucher to obtain this application upon its release. Shipping and handling charges apply.

Copyright © 1997 Corel Corporation. All rights reserved. Corel, WordPerfect, Quattro, Presentations, CorelCENTRAL, Corel Barista and the Corel balloon logo are trademarks or registered trademarks of Corel Corporation or Corel Corporation Limited. Microsoft and Windows are registered trademarks of Microsoft Corporation. Intel and MMX are trademarks or registered trademarks of Intel Corporation. Java is a trademark of Sun Microsystems, Inc. All other product, font and company names and logos are trademarks or registered trademarks of their respective companies.

Corel, Official World Title Sponsor of the COREL WTA TOUR

Official Worldwide Sponsor of Rollerblade

COREL
www.corel.com
Call us for Corel Solutions!
1-613-728-0826 ext. 3000
Document # 1783

KDR-0466-US

CIRCLE 041 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

ZoomIn for Quick Bitmap Enlargements

ZoomIn gives you hotkey access to a zoomed-in edit window and correspondingly slows mouse action.

By Steve Zimmerman and Brent Zimmerman

To make fine adjustments in a bitmap, you often need to zoom in. But zooming invariably requires multiple mouse clicks or keystrokes and often causes you to lose your place. This issue's utility, ZoomIn, solves both problems. Its hotkey pops up a zoomed-in window next to the bitmap you are editing, and the mouse slows to facilitate editing. ZoomIn is application-independent and lets you configure the hotkey as well as the zoom factor and pixel width. It runs under Microsoft Windows 95 and Windows NT 4.0 or later.

You can obtain ZoomIn by downloading it from PC Magazine Online or by mail. (See the sidebar "Getting the Files" for details.) The source code for ZoomIn, written in Microsoft Visual C++ 5.0, is also provided for those interested in seeing how it works.

USING ZOOMIN

To install ZoomIn, copy its program files—Zoomin.exe, Zoomin.hlp, and Keyhook.dll—to a directory on your hard disk and add a shortcut to Zoomin.exe to your Start menu. If you find that you use ZoomIn often, put the shortcut in your StartUp group, so it will be loaded automatically each time you start Windows.

When you run ZoomIn, the program places its magnifying glass icon in the system tray. To toggle the zoom window on and off, double-click the tray icon or press the ZoomIn hotkey. The hotkey is set to Ctrl-` by default, because it's an uncommon key combination that you can press with your left hand while your right hand maneuvers the mouse. You can change the hotkey if you're lefthanded or if you'd prefer another combination.

The zoom window is a thinly outlined square containing a magnified copy of the area surrounding the mouse pointer (see Figure 1). The small flashing square inside the window represents the location of the mouse pointer. To zoom in on a specific area of the screen, move the mouse to that location. The ZoomIn window will follow your movements, typically staying at the lower right of the mouse pointer. If you move the mouse pointer to the extreme bottom or right side of the screen, the ZoomIn window will automatically move to the other side of the pointer to avoid moving off the edge of the screen.

ZoomIn

ZoomIn lets you use a hotkey to pop up a zoomed-in window. It's application-independent and runs under Windows 95 and Windows NT 4.0 or later.

What makes ZoomIn much more than a simple magnifier utility is that when the zoom window is displayed, you can still perform all of the usual mouse and keyboard functions. That's particularly useful in bitmap editors that require the use of the mouse. To exit ZoomIn, right-click its tray icon and choose Exit ZoomIn from the context menu.

CONFIGURING ZOOMIN

ZoomIn allows you to control four different settings: the hotkey combination, the zoom factor, the zoom area, and the hotkey behavior. In order to change any of these properties, right-click on the ZoomIn tray icon and then choose Properties (see Figure 2). Because of programming constraints, the hotkey is disabled as long as the ZoomIn Properties dialog box is visible, but you can bring up a test zoom window by clicking on the image of the globe.

To change the hotkey, put the cursor in the Hotkey edit box, then press the desired key combination. You must use key combinations that include Alt or Ctrl.

The Zoom Area control determines the size of the area that will be magnified in the zoom window. For example, if you set the zoom area to 25, the zoom window will magnify an area of the screen 25 pixels wide and 25 pixels high. You can set the zoom area to any value from 20 to 60.

The Zoom Factor control lets you change the magnification of the ZoomIn window. A zoom factor of 3 means that 1 pixel on the screen will appear 3 pixels wide and 3 pixels high in the ZoomIn window. You can set the zoom factor to any value from 2 to 6.

The "Only display while hotkey is held down" check box lets you change the behavior of the hotkey. When unchecked (the default), the hotkey acts like a toggle; the zoom window remains visible until you press the hotkey again. If you check this option, the ZoomIn window will remain visible only while the hotkey is held down.

INSIDE ZOOMIN

ZoomIn is stored in two program files: Zoomin.exe and Keyhook.dll. Zoomin.exe has two responsibilities: to load and initialize Keyhook.dll, and to provide the interface that lets users configure the zoom window settings. The DLL's job is to detect whether a hotkey has been pressed and display or hide the zoom window. Since the application itself is not as restricted in size as the DLL (more on that later), it takes full advantage of MFC.

Since most of ZoomIn's tasks are handled by the DLL, most of our discussion will be about that portion of the code. In this section, we will describe how to install a Windows hook procedure, how to slow the mouse action

FOR PROGRAMMERS ONLY ZoomIn was written with Microsoft Visual C++ and Microsoft Foundation Classes (MFC). The full source code for ZoomIn, which is available from PC Magazine Online, demonstrates the following programming techniques:

- how to install a Windows hook procedure;
- how to slow the mouse action programmatically using the Windows API function System Parameters Info;
- how to share DLL data under 32-bit Windows operating systems.

SUPPORT Help for *PC Magazine*'s free utilities can be obtained in our online discussion areas, both on the World Wide Web (*www.pcmag.com/discuss.htm*) and on ZDNet in the Utilities section of ZDNet's TIPS Forum (GO ZNT:TIPS). The authors of current utilities generally visit this forum daily. You may find an answer to your question simply by reading the messages posted in the forum. If the author is not available and the forum sysops can't answer your question, the Utilities column editor, who also checks this forum each day, will contact the author for you.

WWW.PCMAG.COM

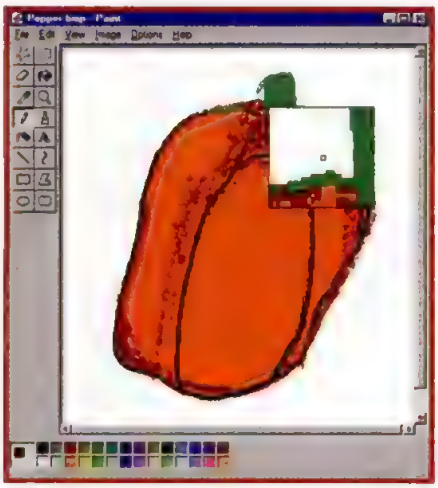


FIGURE 1: *You can perform the usual keyboard and mouse actions when the zoom window is active. Mouse activity slows to make editing easier.*

programmatically, and how to share DLL data under 32-bit Windows operating systems.

WINDOWS HOOKS

ZoomIn's ability to display a zoom window in response to a hotkey, regardless of the active application, is accomplished by means of a systemwide Windows hook. A hook is a mechanism built into Windows that causes Windows to call a subroutine whenever a specified event is detected. A 32-bit Windows hook can monitor specified events in the scope of one particular thread or throughout the system. You can create hook functions to track mouse clicks, keystrokes, messages, or certain other system events, such as the creation or destruction of windows. Systemwide hooks like the one used by ZoomIn can cause lockups if they're not correctly implemented, and they also incur some overhead. But our use of a hook to monitor hotkeys is minimally intrusive.

For each event category, several hooks might be installed. For example, ZoomIn may not be the only application monitoring keystrokes. Thus Windows maintains a "hook chain" for each type of hook. When an event occurs that applies to a particular type of hook, Windows passes information describing that event to the first procedure in the chain, which can then do one of three things:

- pass the event information to the next hook procedure in the chain without modifying it;
- modify the information before passing it on;
- or prevent the event information from being passed on to the next hook procedure.

To install a Windows hook, you call the Win32 API function `SetWindowsHookEx`, which takes four parameters: the hook type (type of event to monitor), a pointer to the hook procedure, the module handle of the DLL containing the hook procedure (if applicable), and the thread associated with the hook procedure (if applicable). If the last parameter is 0, the hook is systemwide and is associated with all running threads.

When you call `SetWindowsHookEx`, Windows installs your hook procedure at the beginning of the hook chain. Thus, regardless of how many hooks might be registered, if your code is the last to call `SetWindowsHookEx`, Windows will call your procedure first when an applicable event occurs. In most cases, you'll pass the event to the next procedure in the chain by calling `CallNextHookEx`. If the hook code returns a nonnegative value, you may suppress the event by skipping the call; otherwise, you must pass it on.

ZOOMIN'S HOOK

When you install a systemwide hook, you must place the hook procedure in a dynamic link library (DLL) and then call the DLL code from a separate application. In our case, the hook procedure is stored in Keyhook .dll and installed from the shell application, Zoomin.exe.

Since Keyhook.dll contains a global hook procedure, it's loaded into the address space of every running process, and its memory footprint must be as small as possible to minimize its impact on the system. For that reason, we didn't use any MFC code inside the DLL, which let us keep the size of the DLL to less than 30K.

The installing application must have the module handle of the DLL containing the hook, so it must first load the DLL into memory.

Instead of calling `SetWindowsHookEx` directly, ZoomIn adds an initialization function to the DLL (in addition to the hook procedure,

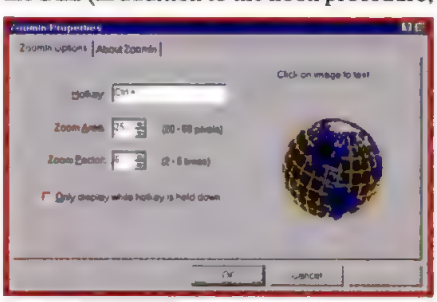


FIGURE 2: *ZoomIn's Properties dialog lets you control four settings: the hotkey combination, the zoom factor, the zoom area, and the hotkey behavior.*

of course) that calls `SetWindowsHookEx`. The installing application can then link to the DLL implicitly and call the installation function. Keyhook.dll exposes an initialization function called `KHAttachHookDLL`, which ZoomIn calls at start-up. `KHAttachHookDLL` installs the keyboard hook procedure, named `MyKeyboardProc`, and also handles removal of the hook.

Since our message type for the hook is WH_KEYBOARD, `MyKeyboardProc` is called whenever WM_KEYUP or WM_KEYDOWN is sent. The first thing it does is check whether the key that has been pressed matches the hotkey. If so, it toggles the visibility of the zoom window and eats the keystroke. That's why it's important to choose a hotkey that isn't used by other applications. If the key is not the hotkey, we call `CallNextHookEx` to pass the key along to the next hook in the chain.

To release a hook procedure, you call `UnhookWindowsHookEx`, which removes the procedure from the hook chain. Since a global hook procedure is called in response to messages generated from every application in the system, Windows must implicitly load the DLL containing that procedure into the address space of every process. Thus, calling `UnhookWindowsHookEx` (or even `FreeLibrary`) from within the installation application does not immediately remove the DLL from memory; Windows must wait until all of the messages sent to the hook procedure have been handled.

As we mentioned earlier, employing a systemwide hook slows down the entire operating system slightly. There are several reasons for this; the most important is the additional processing performed each time a message is generated. You should avoid installing a systemwide hook unless it's absolutely necessary, and when it is, do what you can to minimize the processing done by the hook procedure.

THE ZOOM WINDOW

Even though the zoom window is shown and hidden each time a user presses the hotkey, it is actually created only once. In fact, the zoom window is created when the `ZoomIn` module calls `KHAttachHookDLL`.

When the zoom window is visible, it must continually update the image to represent accurately a zoomed-in version of the area around the mouse pointer as the mouse moves across the screen. In order to make that possible, the KeyHook DLL does two things during the creation of the zoom window: It creates and realizes a palette that matches the palette of the display, and it sets a timer that will be used to update the window. When the zoom window is visible, each time it receives a WM_TIMER message—which we've arbitrarily set to fire at 50-millisecond intervals—it calls `StretchBlt` to create and display a bitmap copy of the area surrounding the mouse pointer. Because the image updates occur quite frequently, the

Experience Innovation

MITAC 5027 Has All The Bells & Whistles. And That's For Sure!

Not only is the system's unique battery design, full-sized keyboard, port replicator and **14.2"** high-resolution LCD in a class of their own, this sleekly contoured machine also offers the best CPU performance on the notebook platform, ideal for today's executive. Supporting Intel® MMX™ microprocessor speeds of up to **233MHz**,as well as up to **128** MB of DRAM, a high-speed CD-ROM drive, IrDA and other speed-charged specs plus **3D** surround sound, the system lets the user zap through multimedia applications like never before. What's more, its multipurpose bay and second battery provide top modularity and operating longevity.

To put it simply, MITAC 5027 is the top portable system every professional would love to have. What about you?

Check out this award-winning notebook at a MITAC office or associate near you. Alternatively, call, fax or e-mail us today and find out for yourself why BYTE named this dapper machine the coolest notebook at Computex, the world's third largest computer exposition.

* The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation.
* Specifications are subject to change without notice

COMDEX Fall '97
November 17-21, 1997
Las Vegas Convention Center
Visit MITAC at Hall S-2, L2435

MITAC

Global Resources Serving Individual Needs

MITAC INTERNATIONAL CORP. (TAIWAN)
Tel:886(3)3289000 Fax: 886(3)3280928
MITAC USA INC.
Tel:1(510)6563333 Fax:1(510)2526930
SYNNEX INFORMATION TECHNOLOGIES, INC. (U.S.A.)
Tel:1-800-7563888 Fax:1(510)4403777
E-mail: market@smtplink.mic.com.tw **(URL):** http://mitac.mic.com.tw/

CIRCLE 036 ON READER SERVICE CARD

Expand Your Capabilities!

(without collapsing your checkbook)

When it comes to number crunching, data processing, information storing, graphics generating, presentation blasting performance, Sceptre notebooks rock!

These Sceptre notebooks, from the extreme-performance/ extreme-value S4500 featuring a 166 MHz Intel Pentium® Processor with MMX™ technology to the ultra extreme-performance S5500 featuring a 233 MHz Intel Pentium® Processor with MMO™ (Intel Mobile Module) technology, come with these features:

- Intel low voltage mobile TCP Processor and system controller chipsets
- 2 Type II / 1 Type III PCMCIA slots
- Built-in stereo sound
- 9-cell Lithium-Ion battery with built-in remaining life indicator
- Microsoft Windows 95 installed
- Industry standard security lock ready
- IrDA 1.0 Standard compliance
- One year warranty

Options for Your Soundx

- 33.6k Fax/Modem
- IO port replicator
- Auto hot docking station
- Extended warranty

SOUNDX 5500	SOUNDX 5000	SOUNDX 4500
• 233 MHz Pentium® Processor with MMO™ Technology • 13.3" TFT XGA Display • 48MB RAM (144MB Max.) • 512KB L2 Pipeline Burst Cache • 3.0 GB Hard Drive • Options Bay with 16X CD-ROM or 3.5" Floppy Drive (both included) or Optional 2nd Lithium Ion Battery • Supports ZV port. Card Bus technology • PCI Bus with 128-bit Graphics Accelerator (16.7 M True Colors) • Touchpad / 6.2 lb.	• 233 MHz Pentium® Processor with MMO™ Technology • 12.1" TFT SVGA Display • 32MB RAM (144MB Max.) • 512 KB L2 Pipeline Burst Cache • 2.0 GB (Up to 3.0 GB) Hard Drive • Options Bay with 16X CD-ROM or 3.5" Floppy Drive (both included) or Optional 2nd Lithium Ion Battery • Supports ZV port. Card Bus technology • PCI Bus with 128-bit Graphics Accelerator (16.7 M True Colors) • Touchpad / 6.2 lb.	• 166 MHz Pentium® Processor with MMX™ Technology • 12.1" TFT SVGA Display • 16MB RAM (80MB Max.) • 256KB L2 Pipeline Burst Cache • 2.0GB (Up to 3.0GB) Hard Drive • Options Bay with 12X CD-ROM / 3.5" FDD Module (concurrent use) or Optional 2nd Lithium Ion Battery • Supports ZV port.Card Bus technology • PCI Bus with 128-bit Graphics Accelerator (64K Colors) • Touchpad / 6.9 lb.
$4,999	**$3,999**	**$2,999**

To get you hands on one of these capability expanding machines so you too can rock, call:

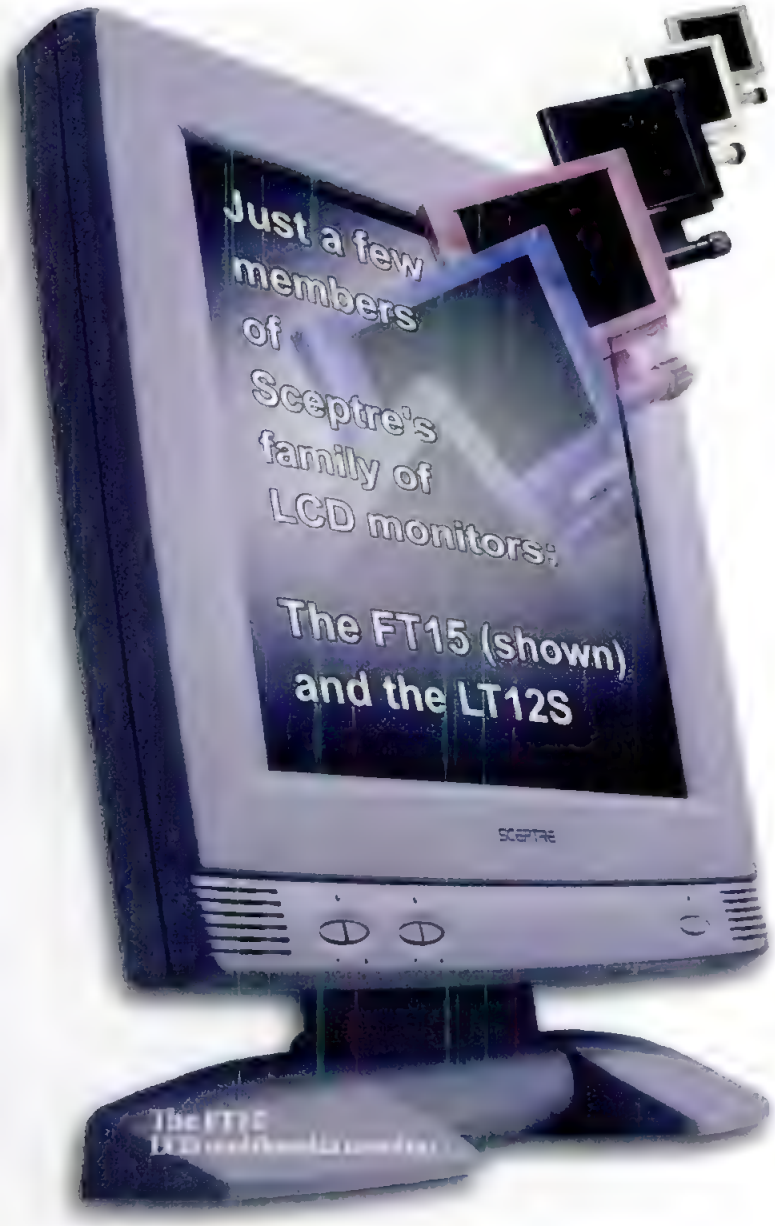
888-580-5588

Check out our website at:
www.sceptretech.com

SCEPTRE®

The First, The Best, The Only

Been There, Done That!



Our current model, the FT15, is Sceptre's 5th generation flat panel monitor. We definitely have been there and done that when it comes to providing LCD flat panel monitor solutions! Read what these people have to say about Sceptre:

"I was confronted with the problem of creating an easy to use, computer friendly workstation for our executives who demonstrate our Britannica Online®... I needed a monitor that was both technically and aesthetically appropriate ... Sceptre's LCD allows us to do everything we need to. The price was within our range as well. It's worked like a champ."

Larry Merrick, Vice President, MIS
Encyclopedia Britannica

"I reviewed a few different flat panel monitors. Sceptre's was the best in terms of dimensions, features, and lack of interference. It was also the most realistically priced. It was a pretty easy choice."

Richard Hinson, medical research scientist
Wyeth-Ayerst Research

To find out how a Sceptre LCD flat panel monitor can provide the solution to your challenge, visit our web site at:

www.sceptretech.com

or give us a call at

800-788-2878

1024 x 768 resolution
14.5" diagonal view
Amplified stereo speakers
2.5" thin (without base)
7.5 lb. light (without base)
Easily detached base
(FT15 also available in charcoal gray)

SCEPTRE®

EXCELLENCE FOR ALL THE WORLD TO SEE

CIRCLE 146 ON READER SERVICE CARD

zoom window always stays in sync.

While we were zooming in on a certain section of the screen, editing a bitmap seemed to require enormous manual dexterity. As a result, we decided to reduce the mouse speed to its slowest setting while the zoom window was visible. After tinkering with several ineffective kludge solutions, we stumbled upon the function `SystemParametersInfo`, in the Windows API. The function lets you modify several different system parameters, one of which is the speed of the mouse.

SHARING DLL DATA

Since we are using a systemwide hook, Keyhook.dll is mapped into the address space of every running process. One of the biggest challenges we faced was figuring out a way to share data among instances of Keyhook.dll. As it turned out, the solution was a simple one, but we ran into a couple of snags that warrant explanation.

Under 32-bit Windows operating systems, each process has its own virtual address space. That means the data owned by one process is completely invisible to the data owned by all other processes. Thus, at any given time several instances of Keyhook.dll might be loaded into memory, but none of those instances would know anything about each other's existence.

As you might recall, that's not how DLLs work under Windows 3.1. A 16-bit function named `GetModuleUsage` returns the number of "live" instances of a DLL. Furthermore, if you define a global variable in a DLL, that variable is shared by every process using the DLL. At first that may seem to represent a better solution, but in fact the 32-bit model offers significant advantages. Making separate instances of a DLL invisible to each other prevents critical errors in one instance of the DLL from affecting the health of the other processes that are using it.

In the case of Keyhook.dll, however, we need to make some information truly global—that is, we need to share data among all instances of the DLL. If a user changes the zoom window preferences from within Zoomin.exe, those changes need to be reflected everywhere—not just inside the application. Obviously, changing the hotkey setting from within the ZoomIn Properties dialog box should change the hotkey used to display the zoom window from within every application.

There are several different ways to share data among processes. The easiest is to use the `#pragma data_seg` directive in Visual C++. (Other compilers have similar commands that do the same thing.) To use `#pragma data_seg`, you need to do only two things. First enclose the definition of the global variables you want to share among instances of your DLL in a named data section:

```
#pragma data_seg("SHARDATA")
WORD wMyHotkey = 132;
HWND hwndZoom = NULL;
HHOOK hHook = NULL;
BOOL bEnabled = FALSE;
BOOL bPersist = FALSE;
#pragma data_seg()
```

You can give the data section any name you'd like; we chose SHARDATA. Next, you must specify the correct sharing attributes for your named section in the dynamic link library's .DEF file:

```
SECTIONS
SHARDATA Shared
```

That sounds simple enough, so you might be wondering about the snags we ran into. First, if you don't assign a value to a shared global variable when it's defined, it doesn't actually get shared. Though we scoured the online help for information that would back up our observation, we could find no Visual C++ documentation, but it's easy enough to verify. If you remove the assignment statement from the definition of the global variable `wMyHotKey` (found in Keyhook.cpp), ZoomIn will not work correctly.

The second snag is this: If your DLL needs to share a global instance of a C++ object, the `#pragma data_seg` directive will not suffice. Consider the following code:

```
#pragma data_seg(".myseg")
_declspec(dllexport) CTest
Counter1(0);
_declspec(dllexport) short
Counter2 = 0;
#pragma data_seg()
```

Whereas the value of `Counter2` will be set to 0 only the first time a process is attached to the DLL, the constructor for `Counter1` will be called every time. In short, to share C++ objects among instances of a DLL, you must use a more sophisticated technique, such as memory-mapped files.

We hope you'll find ZoomIn useful. Aside from the fact that it's a really handy utility, it serves as a good example of how to write an effective system hook. Although hooks are certainly not the answer to every programming problem, perhaps our code will help you overcome many of the hidden pitfalls you'll encounter should you decide to venture down that road. PC

ZoomIn was cowritten by Steve Zimmerman and Brent Zimmerman, brothers and Windows programmers based in Utah.

Sheryl Canter is the editor of the Utilities column and a contributing editor of PC Magazine.

GETTING THE FILES

Here's how you can access PC Magazine Online, where you'll find all our utilities and other PC Tech files:

ZDNET To join CompuServe/ZDNet (formerly ZiffNet), call 800-895-4596 (voice) and request the PMZ offer. CompuServe members can join ZDNet by typing GO ZIFFMEM at any CompuServe ! prompt. You can get the current utility by typing GO FREEUTIL at any CompuServe ! prompt. Other PC Tech files are available individually, in the Utilities/Tips forum, and bundled within volume archive files.

INTERNET You can obtain the utility and an issue archive file by visiting our World Wide Web site at *www.pcmag.com/download.*

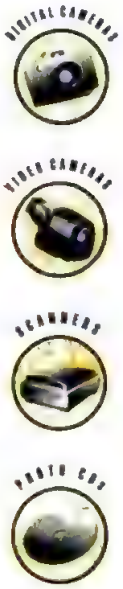
You can also get the files through anonymous FTP from our Internet site. The address is *ftp.zdnet.com.* Use the word `anonymous` as your log-on name and any of your e-mail addresses as the password. Look in the subdirectory */pcmag/1997/1007/.* The volume archive filename is v16n17.zip. The utility and archive are compressed with PKZIP, Version 2.04.

BY FAX OR MAIL If you don't have a modem or Internet access, you can fax 508-368-0141 or write to *PC Magazine* Utilities, c/o Image Software Services, 67 Buena Vista St., Devens, MA 01432.

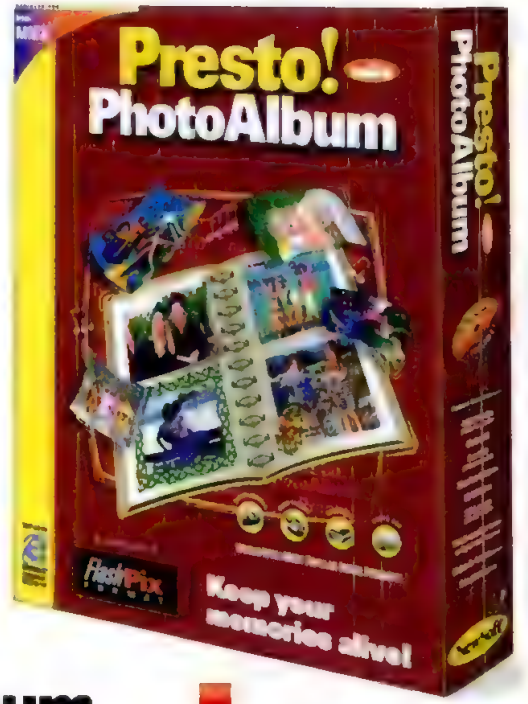
The programs presented in PC Magazine *can be copied but are copyrighted. You may make copies for others if no charge is involved, but making copies or using any portion for any commercial purpose is strictly prohibited.*

Keep Your Memories Alive Forever!

Just Take Your Favorite Images.



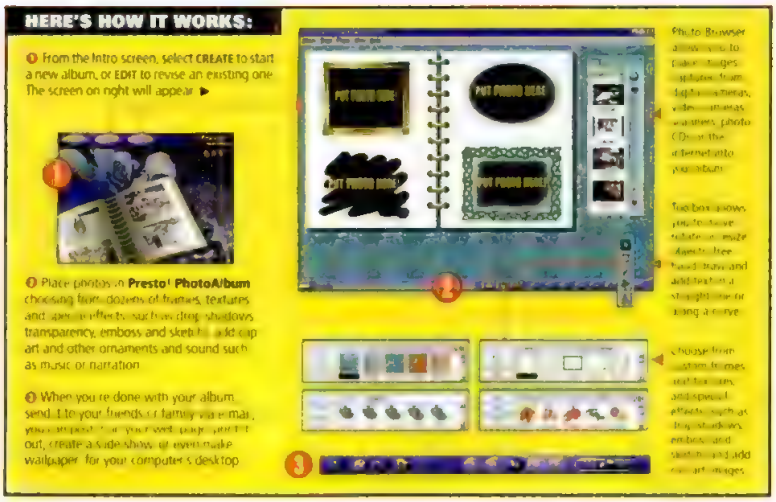
Input Them Into Your Computer



With Presto! PhotoAlbum

And Let the Fun Begin!

Presto! PhotoAlbum allows you to create your own personalized photo albums so you can organize, preserve and share your photos forever – digitally! Just add your favorite photos from digital cameras, scanners or the internet. Decorate them with frames, shadows, clip art, captions, textures and special effects. Record narratives for each photo or an entire page. Then share your album with family and friends via e-mail or post it to your web site. It's Fun & Easy!



Now available at:

BEST BUY COMPUSA COMPUTER CITY

FOR MORE INFORMATION, CALL:
1-800-670-7266
OR VISIT US ON THE INTERNET AT:
http://www.newsoftinc.com

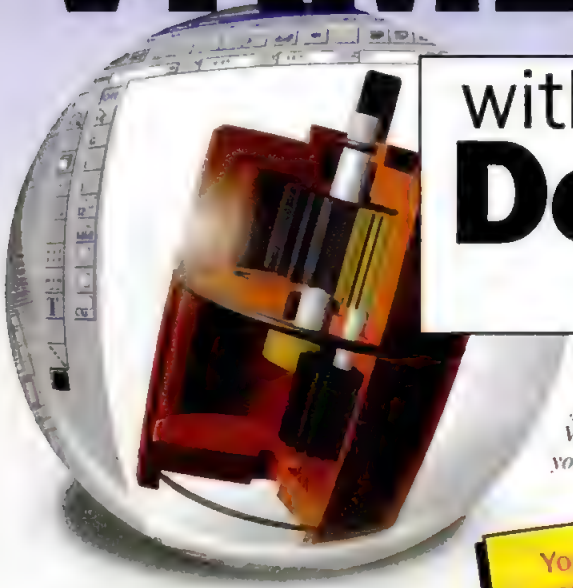
NewSoft

(Outside the U.S., please call (510) 445-8600) ©1997 NewSoft, Inc. Presto! PhotoAlbum and the NewSoft logo are trademarks of NewSoft, Inc. All other product names are trademarks of their respective owners.

Create

EFFECTIVE *intriguing* **Impressive** DAZZLING FLASHY STUNNING DETAILED

VRML Images

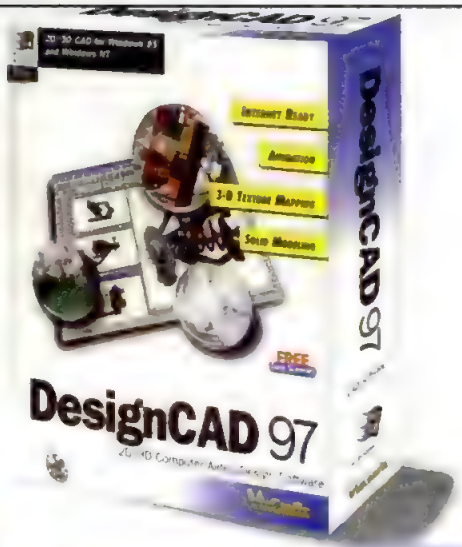


with

DesignCAD 97

2D/3D CAD System for Windows 95 or Windows NT

DesignCAD 97 makes jpg images and 3D VRML files for use on your web page!



Your Creativity is the only limit.

INTERNET READY
- Output JPG, TIF, and TGA files.
- Create 3D VRML files.
- E-mail directly from DesignCAD.

ANIMATION AND PRESENTATION
- True 3D texture mapping.
- Great animation with AVI support.
- New anti-aliasing.

SMART EDITING
- Dozens of innovative editing features to enhance your drawings.

3D SOLID MODELING
- Create virtually any 3D surface with surface construction tools.
- Boolean operations allow precise solid additions, subtractions.

CUSTOMIZATION
- Full keystroke and screen customization.
- OLE automation with Visual Basic and C++.

MORE . . .
- Direct scanner support with bitmap to vector conversion.
- Embed designs into other documents with Windows Clipboard and OLE-2 options.
- Read and save DWG, DXF, IGES, and HPGL file formats.
- DesignCAD Developer's Kit for creating special features.

30 DAY MONEY BACK GUARANTEE

FREE TECH SUPPORT

only $499*

*Competitive upgrade $299

CALL FOR FREE DEMO CD

Call, fax, or e-mail your order to:

800/233-3223

ViaGrafix

One American Way, Pryor, OK 74361

918/825-7555
fax: 918/825-6359
www.viagrafix.com
sales@viagrafix.com

H-6012-7

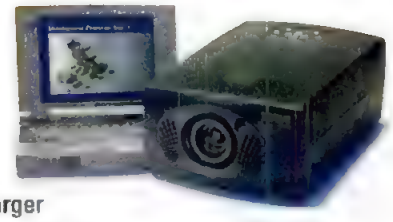
CIRCLE 243 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Complex graphics, detailed text, colorful pie charts, massive spreadsheets. Calls for XGA resolution.

The only way to show high res

is with my Proxima DP9200.

When it comes to presenting, high resolution is everything. I mean, besides brightness and portability. That's why the DP9200 is my only projector. It's both astonishingly bright and amazingly light—a rare combination in a high res projector. It's workstation compatible, too. But the real beauty is that, even at larger sizes, the image is incredibly crisp and bright. And that helps me get my point across.



Proxima DP9200

Call us today for a demo and request your FREE "The How-To's of Powerful Presentations" booklet!

800-447-7692 ext. 439

www.proxima.com

Don't forget to ask about our Proxima® Bright Lease™ program.

Proxima is a registered trademark and Bright Lease is a trademark of Proxima Corporation. ©1997 Proxima Corporation. All rights reserved.

PROXIMA®
MULTIMEDIA PROJECTORS

CIRCLE 132 ON READER SERVICE CARD

INTRODUCING THE WORLD'S FIRST 19" MONITOR.

A breakthrough from Hitachi.

It's not just a new monitor size. It's new display technology that's got everything you ever wanted in a big screen monitor — better performance, smaller footprint, even the perfect price.

	HITACHI ELITE 751	SONY 20SEII
TUBE SIZE	19"	20"
PITCH	0.22 (H) 0.14(V)	0.25
MAX. REFRESH @ 1600 x 1200	75 Hz	75 Hz
SUGGESTED RETAIL	$1,149	$2,000

THE SONY IS AN INCH BIGGER BUT COSTS 74% MORE.

Get similar savings over other high-end 20 and 21 inch monitors as well

The performance of the best 21" monitor.

The image quality of the new 19" SuperScan Elite 751 is every bit as good as the best 21" monitor — and in some ways better. For example, its focus is a full 30% sharper than the previous state-of-the-art. Plus it delivers brighter, richer color and improved contrast at the same time.

It's also one of the few monitors of any size that gives you *genuine* 1600 x 1200 resolution — not a simulation. And one of fewer still that does it flicker-free to the VESA recommended 75 Hz refresh rate.

The new tube with multi-step dynamic focus and auto-astigmatism correction is also flatter than many CRTs so it displays a more accurate image with less distortion, even at screen edges and in the corners.

MONITOR	TUBE SIZE (Viewable size)	PITCH (mm)	1600 HORIZONTAL PIXELS?
NEC P750	17" (15.6")	0.25 mask	NO
SONY 17SEII	17" (16.0")	0.25 AG	NO
HITACHI ELITE 751	19" (18.0")	0.22 horiz.	YES (1672)
SONY 20SFII	20" (19.1")	0.30 AG	NO
VIEWSONIC GT800	20" (19.1")	0.30 AG	NO
MITSUBISHI 91TXM	21" (19.7")	0.28 AG	NO

Beware of monitors that claim 1600 x 1200 but lack a tube that can resolve 1600 horizontal pixels. Compare screens at 1600 x 1200 before you buy.

The footprint of a 17" monitor.

Look at the footprint and you're in for another surprise. The same technology that made our tube better also made it shallower — just 18.1". So it fits on narrower work surfaces.

And it's priced at just $1,149 (SRP*)

There's one more bonus to our new 19" tube technology. It's a lot less expensive to make so it goes for hundreds less than a comparable 20" or 21" monitor.

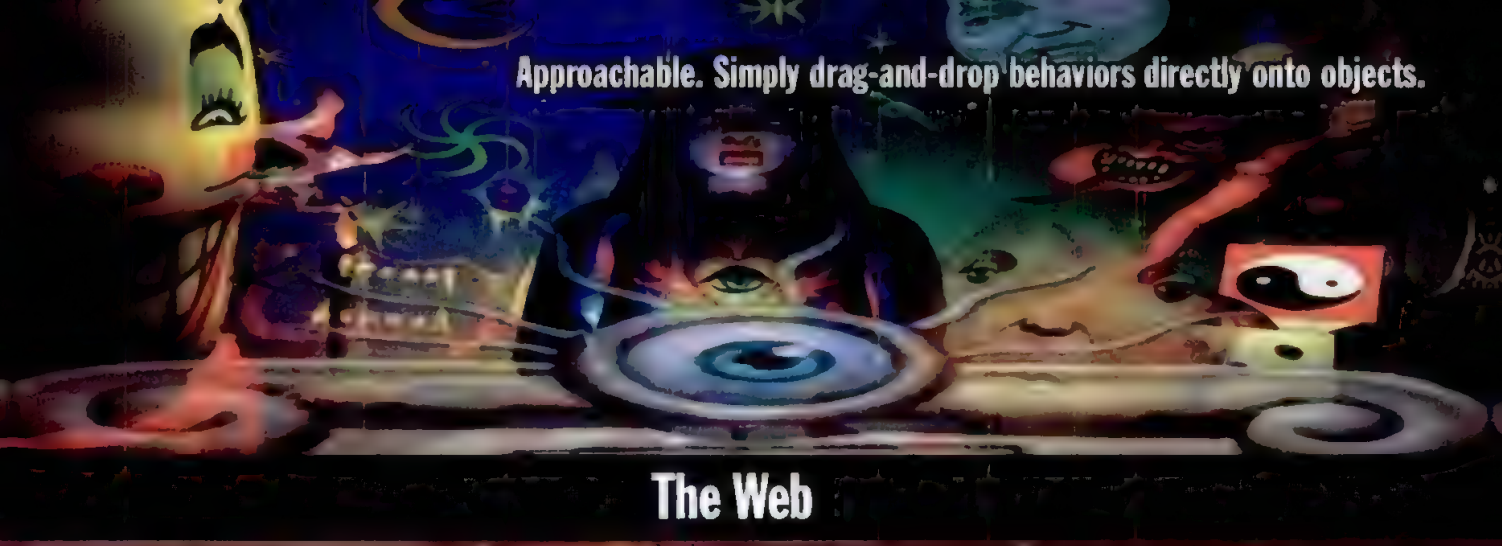
So if you want the resolution of a big screen monitor without the bulk and price of a conventional 20 or 21, you've got to see the new Elite 751. Call for details and dealers near you. 800 441-4832.

SuperScan
An advantage you can clearly see.

HITACHI

NSA 200 Lowder Brook Drive, Westwood, MA 02090 TEL: 800 441-4832. Faxback: 800 555-8552. www.nsa-hitachi.com
*SRP — Suggested Retail Price

CIRCLE 140 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

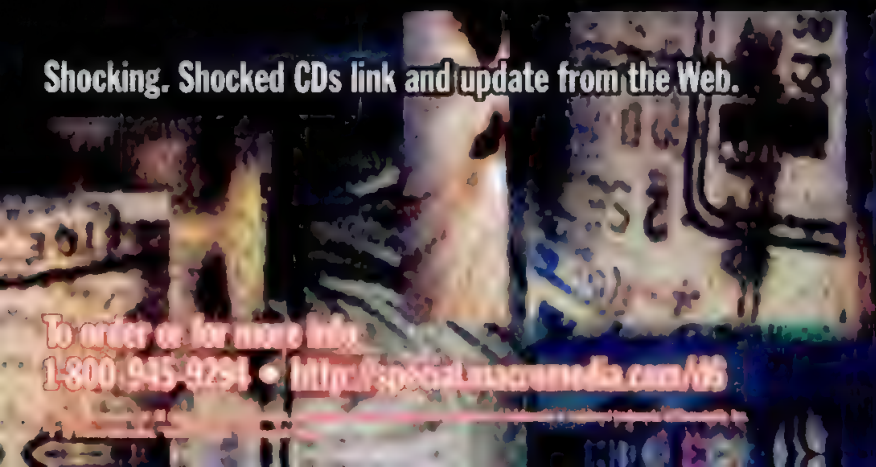


The Web

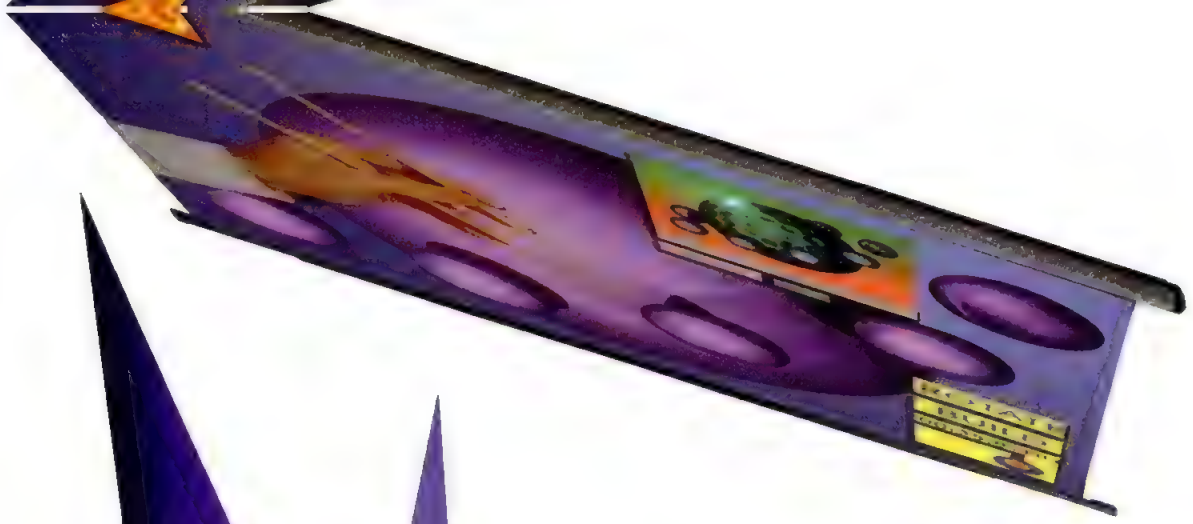
Powerful. Streaming Shockwave™ movies play as they download.

can't make a move without it.

Director® 6.0.1 now available.



macromedia®



Leave it to the

COOLEST PROJECTOR

to keep you from sweating.

THE NEW LITEPRO® 720.
A PROJECTOR THAT'S INCREDIBLY ADVANCED, YET AMAZINGLY EASY TO USE.
TRY IT 3 DAYS FOR THE PRICE OF 1:
1-800-294-6400 or www.infocus.com/pcm

This projector is cool. Literally.
It all starts with the efficient optical system.
It delivers intense, saturated colors with a lower wattage lamp. Which requires a smaller power supply.
Which means it's lighter, quieter, and, of course, cooler. And since industry-leading In Focus® projectors are the easiest to use, you'll be cooler, too.

TRUE 800 x 600 SVGA RESOLUTION
POLYSILICON LCDs
450 LUMENS
ONLY 12 POUNDS
THE QUIETEST — 41dB

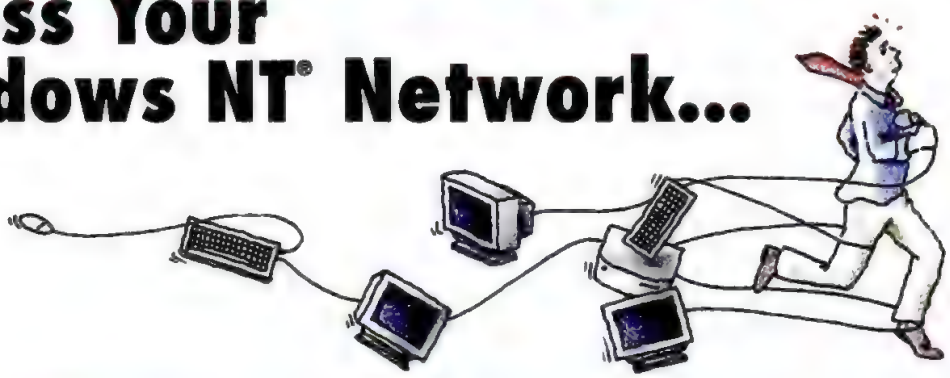
InFocus®

Phone (503) 685-8888 Fax (503) 685-8631. In Europe: Phone (31) 23 5623200 Fax (31) 23 5624388. PCM ©1997 In Focus Systems, Inc. In Focus and LitePro are registered trademarks of In Focus Systems, Inc.
Image no. 0511097 ©1995 PhotoDisc, Inc.

CIRCLE 390 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

ELIMINATE FRAGMENTATION

Across Your Windows NT® Network...



...WITHOUT LEAVING YOUR DESK!

Microsoft recognizes that fragmentation impacts Windows NT performance and recommends Diskeeper to *eliminate* fragmentation as a performance issue.

Windows NT starts fragmenting the moment it is installed, and due to its speed and compression features, it creates staggering amounts of fragmentation. Application load times increase. Users lose time and become frustrated.

Only Diskeeper allows you to control all the defragmentation on all the drives throughout your network right from your administrative console. Your time is valuable. Running around to each workstation to run a defragmenter is out of the question. So is giving users administrative privileges to handle it themselves.

Only Diskeeper, the fully automatic network defragmenter, brings you the power and functionality of a real corporate solution with "Set It and Forget It"® ease.

"Diskeeper will make the System Administrator's life much, much easier."
–Marshall Goldberg, MICROSOFT

ORDER RISK FREE TODAY!

For best price, call your local Reseller or call

1-888-GET-DKNT

4 3 8 - 3 5 6 8

Suggested Retail Price: Workstation version $75.00 Server version $399.00

Designed for Microsoft BackOffice

Executive Software
www.execsoft.com

FREE TRIAL DISKEEPER SERVER AND WORKSTATION

Diskeeper version 2.0: automatic, full scheduling and complete network controls. The only network defragmenter on the market. Download this 30-day trial now.

www.diskeeper.com

© 1997 Executive Software All rights reserved. *DISKEEPER* and Set It and Forget It are registered trademarks owned by Executive Software. Windows NT and the BackOffice logo are registered trademarks of Microsoft Corporation.

CIRCLE 211 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Burns CDs in her kitchen.
ComputerLife
FIND OUT WHAT YOU CAN DO.
To subscribe, call 1-800-926-1578 or visit http://www.zdnet.com/~complife/

These Pencils Have Been Sharpened By A DIAMONDTRON.

Sharpen your competitive edge with a DIAMONDTRON aperture grille monitor from Mitsubishi Electronics. Screen images come alive with razor-sharp focus and clarity. Bright, vivid colors with superb contrast. On-screen display system with intuitive front-panel controls. All in ergonomic, exceptionally compact enclosures, with a variety of models in the 17" (16.0" diagonal viewable image) and 21" (19.7" diagonal viewable image) size categories. Plus, Mitsubishi's reputation for quality and durability is backed by a 3-year warranty. Mitsubishi originated the award-winning DIAMONDTRON CRT technology, and continues to innovate rather than imitate. Experience the DIAMONDTRON difference by contacting Mitsubishi Electronics today.

MITSUBISHI DIAMONDTRON CRT TECHNOLOGY

USA: 1-800-843-2515 • Canada: 1-800-387-9630 • Qwikfax: 1-800-937-2094
World Wide Web: www.mitsubishi-display.com

MITSUBISHI DISPLAY PRODUCTS
*Innovation On Display*sm

CIRCLE 280 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Yes. Over. Finished. Kaput.

'Cause now there's new **NUTS & BOLTS**. When it comes to saving your system, it beats Norton cold.

Simply put, **NUTS & BOLTS** is a package of brilliant, virtually automatic utilities that **PREVENT** crashes, **OPTIMIZE** your hard drive, **MAXIMIZE** performance, **ELIMINATE** conflicts, **REPAIR** damage, **SECURE** files, **SHRED** sensitive stuff, **ALERT** you to potential problems, **RESCUE** lost files, **DIAGNOSE** your system, **CUSTOMIZE** your Windows, **INCREASE** speed, **FIX** glitches, and **CHECK** program compatibility.

Like a nerd in a box

As if that ain't enough, **NUTS & BOLTS** does all this almost invisibly and with very little involvement on your part (Y'hear Norton? You can be a dummy and it'll still do its job!)

NUTS & BOLTS is like having your own resident nerd – only better. 'Cause it's there before you need it and whenever you need it. And it costs about fifty bucks. Yeah, $50! (And unlike a nerd, it doesn't wheeze or giggle.)

Guaranteed...

NUTS & BOLTS is guaranteed. Uh-huh! If you don't like it, return within 60 days and you'll get your money back.

Whaddya got to lose? Without **NUTS & BOLTS** only time, money, your job, your diploma, your tax return, the great American novel, or your surefire screenplay. (But then, you're too smart to live without **NUTS & BOLTS** now that we set you straight.)

Feature	NUTS & BOLTS	Symantec Norton Utilities™	Cybermedia First Aid 97™	ODEK Essential Utilities™
Easy to use Central Interface with Integrated look and feel	YES	—	YES	—
Repairs & Recovers Damaged Files and Hard Drives	YES	YES	—	—
Automated Clean & Repair Windows Registry	YES	Minimal	YES	YES
Rebuild & Optimize Registry for maximum performance	YES	—	—	—
Optimize Hard Drive (N&B Disk Tune is up to 5x faster)	YES	YES	—	—
Clean up Hard Drive	YES	YES	—	YES
Provides Detailed System Info	YES	YES	—	—
Emergency Rescue & Recovery	YES	YES	Minimal	Minimal
Hardware Diagnostics	YES	DOS only	—	—
System Monitor	YES	YES	—	—
Crash Recovery	YES	YES	YES	YES
Crash Protection	YES	—	—	—
Easy System Configuration	YES	YES	—	—
Zip Unzip files	YES	—	—	YES
Zip Integrated with file and Hard Drive Cleanup	YES	—	—	—
High Security Encryption	YES	—	—	—
Security Integrated with File Compression	YES	—	—	—
Secure Erase Feature	YES	—	—	—
Self Decrypting Files for easy e-mailing	YES	—	—	—

"Move Over, Norton, Enter Nuts & Bolts"

– Windows Sources, June 1997

"Tops Norton's Utilities"
– PC Magazine, June 24, 1997

"A winning program"
– PC World, July 1997

So put this magazine down this instant and get your **NUTS & BOLTS**. It'll save you over and over and over again.

Good-Bye, Norton.

Great Buy, NUTS & BOLTS

PC Computing · Windows Magazine EXPERTS' CHOICE · HOME OFFICE COMPUTING BEST BUY

1-800-451-0551

NUTS & BOLTS is another amazing, invisible, affordable, lifesaving product from the wonderful brains at HELIX.

HELIX SOFTWARE CO.

Internet: http://www.helixsoftware.com
Phone: 718-392-3100

©1997 Helix Software Co. All rights reserved. Nuts & Bolts and Disk Tune are trademarks of Helix Software Co. All other trademarks are held by their respective companies

CIRCLE 063 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

The power you've been waiting for at a price you've only dreamed of.

233 MHz

starting at $1,795

The ALR Optima 2

You've waited for the power of the Pentium® Pro processor. You've waited for the enhanced multimedia performance of MMX™ technology. Your wait is over.

Introducing the ALR Optima2. Powered by Intel's® Pentium® II processor, ALR's Optima2 delivers both Pentium Pro power and MMX technology, bringing advanced desktop computing to new heights. Plus with integrated audio, 64-bit video standard, the ALR's Optima2 is ready to take on the latest in business multimedia applications... from international video conferencing to full-blown multimedia sales presentations.

To learn more about the Optima2 or any member of ALR's Optima Series... the series that redefined PCs with affordable performance and unprecedented service and support, please call ALRs toll-free number today.

The Optima Series of desktop, slimline, and mini tower systems are designed with the latest in Pentium® Pro, Pentium®, and MMX™ technology. We've added 64-bit or 64-bit 3D graphics. And some models even feature integrated audio and USB technology.

1-800-444-4ALR

http://www.alr.com

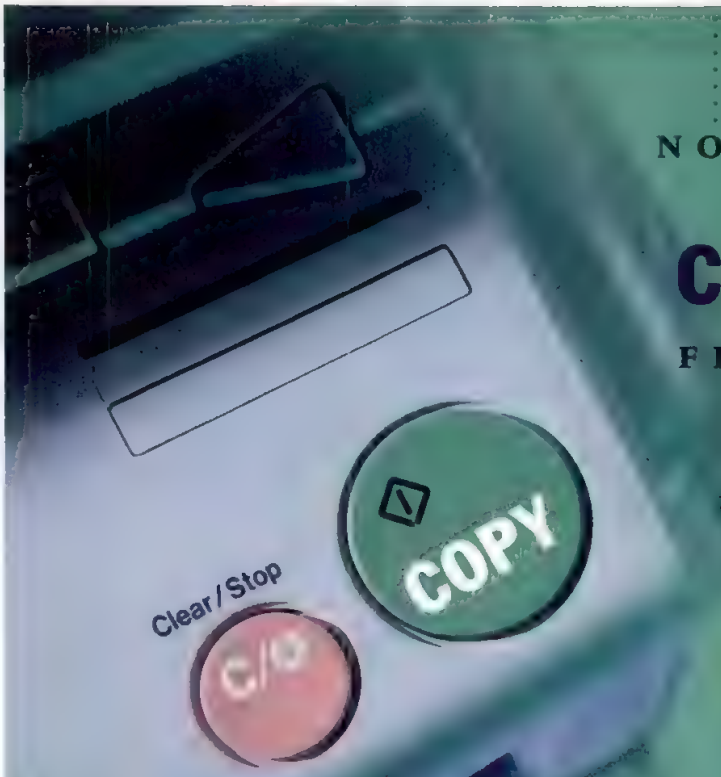
5 YEAR 3G SERVICE warranty

ALR

Advanced Logic Research, Inc.

Monitors sold separately. ALR is on the Internet *CompuServe* - **GO ALRINC.** *& America Online* - **Keyword ALR** Advanced Logic Research, Inc. 9401 Jeronimo, Irvine, CA 92718 (714)581-6770 FAX (714) 581-9240. Prices, configurations and specifications subject to change without notice. Systems shown with optional equipment. Pricing based on U.S. dollars. ALR is a registered trademark of Advanced Logic Research, Inc. Pentium logo and Intel Inside logos are trademarks of Intel Corporation. All other brand and product names are trademarks or registered trademarks of their respective owners. © 1997 by ALR

CIRCLE 064 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink



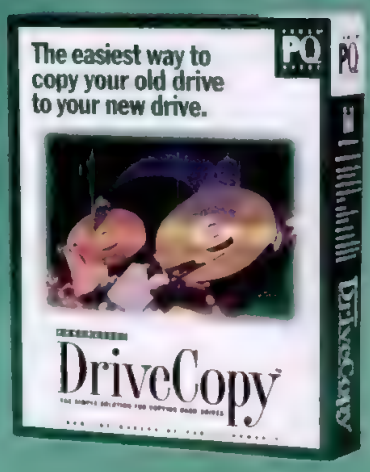
NOW.....

Copying EVERYTHING FROM YOUR OLD DRIVE TO YOUR new drive

IS THIS easy.

INTRODUCING **DriveCopy**,™ FROM POWERQUEST® — THE **safest**, **easiest**, AND MOST **affordable** WAY TO COPY YOUR OLD HARD DRIVE TO YOUR **new hard drive** IN MINUTES.

Remember when upgrading to a new hard drive was more painful than doing your income taxes and riskier than bungee jumping? Well, fortunately now there's DriveCopy, from PowerQuest. With a few simple steps, everything from your old hard drive is automatically copied to your new one without losing a single preference, setting, or byte of data. No re-installing, no data loss, no headaches. At just $29.95, DriveCopy makes upgrading to a new drive more affordable and convenient than ever. All of the most common operating systems are supported by DriveCopy, including all versions of Windows 95, NT, 3.x, DOS, and OS/2. For more information, visit our Web site at **www.powerquest.com**.



Try DriveCopy for 60 days. If you're not completely satisfied, return it to PowerQuest and get your money back. Visit your local software reseller or call 1-800-720-0399.

Best Buy • CDW • CompUSA • Computer City • Egghead • Electronics Boutique
Fry's • Future Shop • J&R Computer World • Micro Center • Office Depot

© 1997 PowerQuest Corporation. All rights reserved. PowerQuest, PartitionMagic, and DriveCopy are registered trademarks of PowerQuest Corporation. Patents pending.

FROM THE MAKERS OF PARTITIONMAGIC®

POWER PQ QUEST

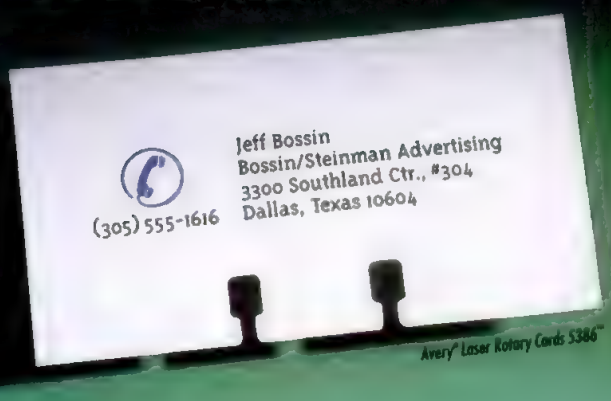
CIRCLE 125 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Behold the elusive "You'd never know what was stuck here a second ago." laser label.

(Not Shown) Avery® Remove'Em™ Laser Labels 6464™

Here today. Or gone tomorrow. Avery® Remove'Em™ Labels stay in place for the long haul. But they can be removed or repositioned easily. And they glide through laser or ink jet printers and come out looking spiffy. You should've seen the one that used to be on this binder.

"I was going to update my contacts, but frankly, my dog has better handwriting."



Avery® Laser Rotary Cards 5386™

So why not get Fido to do it? He's busy napping. Anyway, why would you want handwritten rotary cards? Now you can output Avery® rotary cards on your laser or ink jet printer. So, you ask, "How will all this affect *my* life?" Put it this way, if you had a tail, you'd be wagging it.

Chances are the drug store doesn't have a "Please Attend the Grand Opening of Ben's Reptile Emporium" card section.

Avery® Blank Greeting Card 8316™

But did Ben and his reptiles panic? Of course not. Because Ben designed and printed his own customized announcements. Without hassling with a print shop. Avery® card products feed easily through laser or ink jet printers and work well with popular publishing software. Which allowed Ben to personalize his message without anyone's cage getting rattled. Now that's progress.

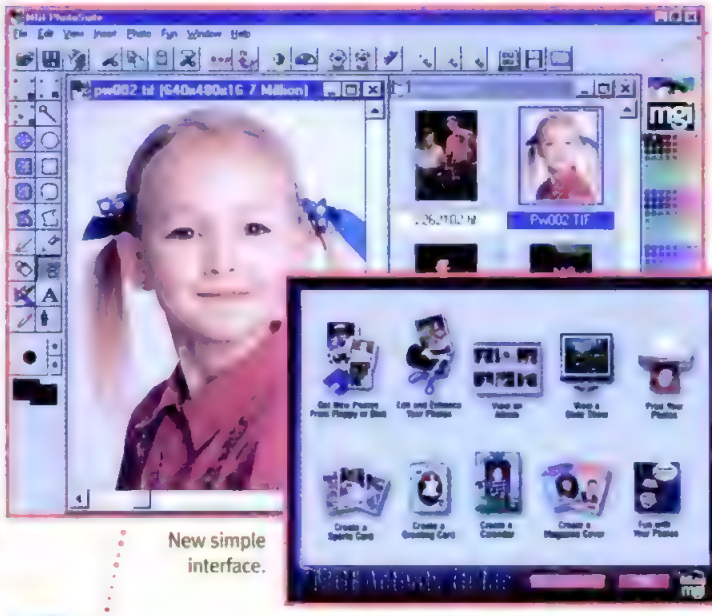
Working smarter instead of working harder. That's what Avery® is all about. Since preset layouts for most of our products already exist in Microsoft® Word, WordPerfect® and LabelPro®, it takes all the guesswork out of what used to be time consuming projects. And just about everything we make can be output on laser or ink jet printers. Making your work day a little easier. And hopefully, a little shorter.

©1997 Avery Dennison Corporation

It Starts With Your Photo!

MGI PhotoSuite is the easiest way to edit, organize and be creative with your photos!

BONUS CD!
Multimedia Library Included.



New simple interface.

New easy-to-use activity guide.

Organize photos into albums

Create your own flyers, posters and ads

Create photo sports cards

Transform your photos using over 30 special effects including: emboss, mosaic, glamor, reverse, splatter and more!

Add your own word balloons.

Create your own photo greeting cards.

You can create magazine covers & calendars.

Improve photo quality.

Have fun with faces using special effects.

You can edit your photos with amazing results.

Get your Photos on a KODAK™ Picture Disk, FREE!
When you purchase MGI PhotoSuite, you receive a special offer from Kodak™ for a free transfer of your photos to disk.

MGI PhotoSuite™

MGI SOFTWARE

CIRCLE 130 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Visit your local retailer or for more information, contact MGI Software Corp. at 1-888-MGI-SOFT or visit www.mgisoft.com (Priority Code PS123)

COMPUSA · COMPUTER CITY · EGGHEAD · MICRO CENTER · FRY'S ELECTRONICS · BEST BUY

#1 Best Seller based on retail unit sales in the U.S. of Windows-based home photo editing software from PC Data Reports, Jan.-Dec., 1996 ©1989-1997 MGI Software Corp. all rights reserved. MGI and MGI PhotoSuite are trademarks or registered trademarks of MGI Software Corp. Kodak is a trademark of Eastman Kodak Company. All products mentioned are trademarks or registered trademarks of their respective companies.

"Imagine never having to go to the post office again"

90 day FREE Trial

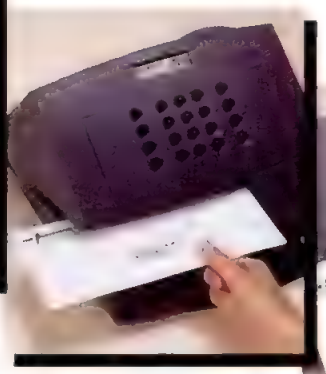
Presenting the world's first personal postage meter, featuring postage refills by phone in under 30 seconds!

In a business world where time is money and image is everything, the new Personal Post Office™ gives you everything you need. You'll never go out for stamps again because postage refills by phone in under 30 seconds with total security. And you'll never use too much postage again because the electronic scale eliminates wasted postage. You can even add your own promotional message to ensure your customers and prospects open *your* mail immediately. And despite its big features, the new Personal Post Office™ fits on a corner of your desk!

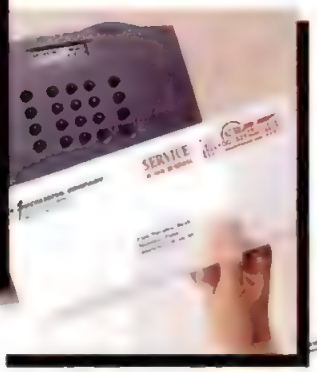
Look At All You Get For 90 Days Free!

* Pitney Bowes Personal Post Office™
* Electronic Scale
* Business-building direct mail CD-ROM

1. Weigh envelope on electronic scale for exact postage



2. Insert envelope and admire instantly metered mail



3. Print a sales message or logo

4. Meter envelopes, flats and packages!

Postage refills by phone... night or day!

Personal Post Office™

Limited time offer, so call now!

1-800-5-PITNEY

Ext. PBPM

Mailing made simple™

Pitney Bowes

We know all about Dell, Gateway and Micron.

We replace them all the time.

Sys kicked butt and took names in performance tests in *PC Magazine, Computer Shopper* and on c|net. We have solutions for every user and budget. State-of-the-art 266MHz Pentium® II processor-based systems to 133MHz Pentium processor-based Value Editions. Custom-built from an amazing array of options—our place to yours—5 to 7 working days. Sys service sizzles too, with 24/7 phone support, first year on-site service, extended warranty options and money-back guarantee. No wonder thousands of canny users (NASA, JPL, MIT, etc.) have already done something brilliant. Bought a computer from Sys instead of the other guys.

Nothing responds like Sys.

SYS VALUE EDITION systems BASE PRICE: $1,234
SYS PERFORMANCE systems BASE PRICE: $1,796
SYS PERFORMANCE systems (Pentium® Pro processor) BASE PRICE: $2,396
SYS WORKSTATION BASE PRICE: $5,995

800-613-9963
http://www.systechnology.com

CIRCLE 316 ON READER SERVICE CARD

FREE AT LAST.

FreeBoard® Beamer FreeBoard™ Disk FreeBoard™ Remote FreeBoard™ Trackball FreeBoard® '95

Absolutely wireless. Absolutely FreeBoard™. Sit, stand, lie down, move anywhere, anytime. Look for genuine FreeBoard technology in leading Web TV™, Network computer and PC/TV products. Call today: 1-888-373-3273. Or visit www.sejin.com.

FREEBOARD BY SEJIN

©1997 Sejin America, Inc., Santa Clara, CA. FreeBoard is a trademark of Sejin America, Inc. All rights reserved.

CIRCLE 142 ON READER SERVICE CARD

Software Product of the Year.

WIN 100 WINDOWS MAGAZINE 1997

Windows Magazine
Summer 1997

The best remote access software you can buy for your PC, anywhere.

If you're already one of the millions of loyal LapLink® users, you don't need a magazine to tell you that it's the perfect link to the desktop or the network.

But if you're still undecided, you should know that LapLink has racked up more prestigious industry awards (twenty-nine of 'em, at last count) than every other remote access software package. Combined.

And now that LapLink is available for Windows® NT, you have every reason in the world to request one of our free, fully-functional trial packs.

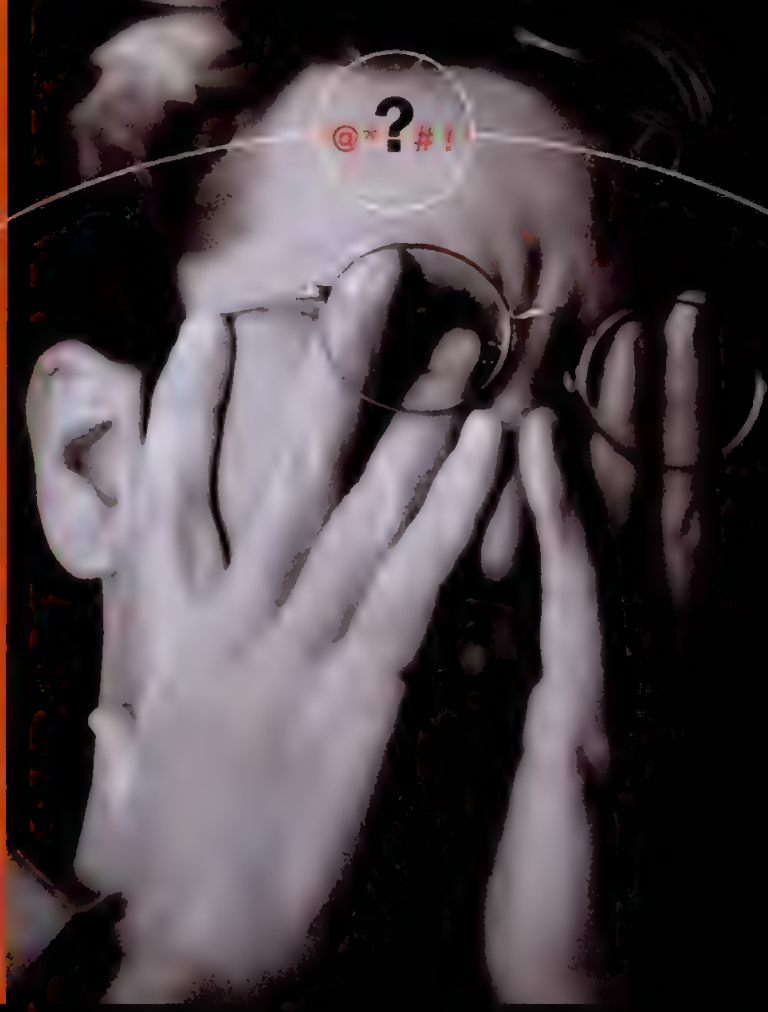
Pick up the phone and dial **800-480-6643**. Or visit our website at **www.laplink.com/ws**.

It just might be the best move you'll make this year.

TRAVELING SOFTWARE

©1997 Traveling Software, Inc. LapLink is a registered trademark of Traveling Software.

CIRCLE 088 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink



microsoft office 97

everything else

where can't you go today?

Way to go Microsoft! Office 97 is packed with hot new features that make i
number one. But those same features make Office 97 file formats incompatible
with previous versions of Office. Or with just about anything else for that matter
Is this a dead end or what?

Conversions Plus to the rescue.

Just in the nick of time, there's new Conversions Plus™ 4.0 to take care of all your Office 97 file conversion needs. From DataViz, the file compatibility experts. Loaded with over 1,000 file translation combinations, Conversions Plus translates hundreds of word processing, spreadsheet, graphic and database file formats. Quickly and accurately. Between many different Windows programs or between Windows and Macintosh. New version 4.0 also includes e-ttachment Opener™, an amazing program which converts garbled e-mail attachments into their original file formats. And MacOpener™, a nifty utility for reading and writing Macintosh disks on your PC.
How's that for a set of tools to get you where you want to go. Today.

DATAVIZ

For details, call ***1.800.270.0030 ext.116*** *or visit our web site at http://www.dataviz.com/CPW5*

And find out for yourself that with DataViz, there are no dead ends.

Runs on Windows 3.1, Windows 95 and Windows NT.

CIRCLE 102 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Available at these locations. COMPUSA BOOKHEAD SOFTWARE MICRO CENTER

User-to-User

BY NEIL J. RUBENKING

Floppy Disk Drive Demons

While trying to find out why I was getting annoying floppy disk drive accesses for no apparent reason, I discovered that all of the following actions involving shortcuts (.PIF or .LNK) cause unexpected drive activity if the command line points to the A: drive:

- *moving a shortcut from a directory to the desktop or Start menu array (the Start menu and its subfolders);*
- *pressing F5 while a shortcut is selected in any folder;*
- *opening the folder containing a shortcut for the first time;*
- *deleting a shortcut;*
- *right-clicking on a shortcut;*
- *clicking OK on the shortcut property window;*
- *starting Windows with a shortcut on the desktop or in the Start menu array.*

In order to avoid the excessive drive activity, put the shortcuts for files on floppy disks in any subfolder other than the desktop or Start menu array.

RICHARD ELLINGSON
Paradise, California

PC MAGAZINE: When the floppy disk drive spins for no apparent reason, some users automatically assume the worst—a virus attack, or demonic possession. Others are simply curious, or annoyed: Why is it doing that? The list above may not include every possible reason, but it certainly hits most of them. If your system's floppy disk drive is hyperactive, check the shortcuts on your desktop and in your Start menu and see whether any of them fit the profile.

First close all open windows, so that the desktop is completely uncovered. Now right-click on each shortcut icon on the desktop in turn, and select Properties from the context menu. Click the Shortcut or Program tab in the resulting dialog (.LNK files have a Shortcut tab; .PIF files have a Program tab). Find the edit box containing the command line, labeled either Target or Cmd Line. If the command line contains a reference to a floppy disk drive, you need to move it off the desktop. Right-click on the desktop and select New | Folder from the context menu. Name the folder Floppy Disk Shortcuts. Now drag the offending shortcut from the desktop into this new folder.

The next step is to clean up the Start menu. Right-click on the Start button and choose Find from the menu. In the Find dialog, enter *.PIF for the filename and make sure that the Include Subfolders box is checked. Then click Find Now. Right-click on each found file, checking for floppy disk drive references as before. If you find a problem shortcut, you can drag it directly from the Find dialog's results list to the Floppy Disk Shortcuts folder. Repeat the process with *.LNK for the filename and your cleanup is done. After this, you should no longer be plagued by unexplained floppy disk drive activity.

Create a Secret Directory

I have a great way to prevent access to a directory through Windows but still allow access through DOS. It works without a password, memory, or even extra software. The trick is to name the directory using certain symbols that DOS provides: the extended characters that you type by holding down the Alt key and a number. (A listing of the characters and their numbers is in your DOS manual.) This method makes accessing the directory difficult even from DOS—you must know how to type in the symbols—and prevents accessing the directory in Windows. File Manager won't even let you highlight it! I locked one of my directories by naming it with eight blank characters produced by pressing Alt-255 eight times.

CARLISLE BEAN
Spartanburg, South Carolina

PC MAGAZINE: By "pressing Alt-255," this reader means pressing and holding the Alt key, tapping out 2 5 5 on the numeric keypad, and then releasing the Alt key. This generates the character whose ASCII code is 255. In a DOS-based program or at the DOS prompt, the character displays as a blank, but it's not the same as the space character; neither Windows 3.*x*'s File Manager nor Windows 95's Explorer will accept it in a directory name. Attempting to open such a folder results in the message "The folder <name> does not exist." Try to delete it and you get "Cannot delete <name>: Cannot find the specified file." Try to rename it and you get "Cannot rename <name>: Cannot find the specified file." Windows 95's Explorer just will not touch this folder, though Windows NT 4's accesses it without trouble.

Figure 1 shows all of the ASCII characters whose codes are greater than 127. By naming directories using each of these characters, I determined that Explorer rejects 76 of them (shown in red). Windows 3.*x*'s File Manager rejects the same characters except for those corresponding to 221 and 249.

The security you gain won't stand up to a hacker attack, but it may prevent your officemates (or children!) from gaining access to your secret files.

Ç	128	É	144	á	160	▒	176	└	192	╨	208	α	224	≡	240
ü	129	æ	145	í	161	▓	177	┴	193	╤	209	ß	225	±	241
é	130	Æ	146	ó	162	▓	178	┬	194	╥	210	Γ	226	≥	242
â	131	ô	147	ú	163	│	179	├	195	╙	211	π	227	≤	243
ä	132	ö	148	ñ	164	┤	180	─	196	╘	212	Σ	228	⌠	244
à	133	ò	149	Ñ	165	╡	181	┼	197	╒	213	σ	229	⌡	245
å	134	û	150	ª	166	╢	182	╞	198	╓	214	µ	230	÷	246
ç	135	ù	151	º	167	╖	183	╟	199	╫	215	τ	231	≈	247
ê	136	ÿ	152	¿	168	╕	184	╚	200	╪	216	Φ	232	°	248
ë	137	Ö	153	⌐	169	╣	185	╔	201	┘	217	Θ	233	∙	249
è	138	Ü	154	¬	170	║	186	╩	202	┌	218	Ω	234	·	250
ï	139	¢	155	½	171	╗	187	╦	203	▒	219	δ	235	√	251
î	140	£	156	¼	172	╝	188	╠	204	▄	220	∞	236	ⁿ	252
ì	141	¥	157	¡	173	╜	189	═	205	▌	221	φ	237	²	253
Ä	142	₧	158	«	174	╛	190	╬	206	▐	222	ε	238	■	254
Å	143	ƒ	159	»	175	┐	191	╧	207	▀	223	∩	239		255

FIGURE 1: *Windows 95's Explorer will not open a directory whose name contains any of the characters shown here in red.*

Help for Disaster Recovery in Windows 95

A hidden program on the Windows 95 CD-ROM lets you create an emergency boot disk that can restore your system should something go wrong. First format a floppy disk, making sure to check "Copy system files" in the Format dialog box. Then place the CD-ROM in your drive, browse to the folder D:\other\misc\eru (where D: is your CD-ROM drive),

COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.™

Get mobile

TOSHIBA

Satellite 220CDS

■ 133MHz Intel Pentium® processor ■ 16MB EDO RAM standard, expandable to 144MB ■ 1.34GB hard drive ■ 10X CD-ROM drive ■ 12.1" dual-scan color display

$1899.13 CDW 89777

Tecra 510CDT

■ 133MHz Intel Pentium® processor ■ 16MB EDO RAM standard, 144MB maximum ■ 2.1GB hard drive ■ 10X CD-ROM drive ■ 12.1" active-matrix SVGA color display ■ 28.8K bps data/fax modem

$2699.76 CDW 77241

Tecra 520CDT and 530CDT

■ 166MHz Intel Pentium® processor with MMX technology ■ 32MB EDO DRAM standard, expandable to 160MB ■ 2.02GB hard drive ■ 10X CD-ROM drive ■ 12.1" active-matrix SVGA (520CDT) or XGA (530CDT) color display ■ 33.6K bps internal data/fax modem

520CDT **$4159.45** CDW 90355

530CDT **$4579.17** CDW 90359

Tecra 730XCDT

■ 150MHz Intel Pentium® processor with MMX™ technology ■ 16MB EDO RAM standard, 144MB maximum ■ 2GB removable hard drive ■ 10X CD-ROM drive ■ 12.1" active-matrix TFT color display ■ Integrated 28.8K bps (V.34) data/fax/voice modem

$3499.77 CDW 80957

Tecra 740CDT

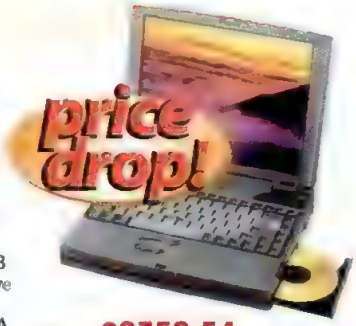
■ 166MHz Intel Pentium® processor with MMX™ technology ■ 16MB EDO RAM standard, 144MB maximum ■ 3GB removable hard drive ■ 10X CD-ROM drive ■ 13.3" active-matrix TFT color display ■ Integrated 28.8K bps (V.34) data/fax/voice modem ■ **Includes Noteworthy Video Conferencing kit with color video camera, CardBus Capture Card and Intel ProShare software**

$4849.62 CDW 87964

Libretto 50CT

■ 75MHz Intel Pentium® processor ■ 16MB EDO DRAM standard, expandable to 32MB ■ 772MB hard drive ■ 1.44MB external floppy drive PC Card ■ 6.1" active-matrix color display

$1929.45 CDW 90350



Satellite Pro 440CDX and 440CDT

■ 133MHz Intel Pentium® processor with MMX technology ■ 16MB EDO RAM standard, expandable to 144MB ■ 1.34GB hard drive ■ 10X CD-ROM drive ■ 12.1" FastScan dual-scan (440CDX) or active-matrix SVGA (440CDT) color display ■ 33.6K bps internal data/fax modem (440CDT only)

440CDX **$2359.54** CDW 90351

440CDT **$2799.55** CDW 90352

Satellite Pro 460CDT

■ 166MHz Intel Pentium® processor with MMX technology ■ 32MB EDO DRAM standard, expandable to 160MB ■ 2.02GB hard drive ■ 10X CD-ROM drive ■ 12.1" active-matrix SVGA color display ■ 33.6K bps internal data/fax modem

$3659.16 CDW 90353

Portege 300CT

■ 133MHz Intel Pentium® processor with MMX technology ■ 32MB EDO DRAM standard, expandable to 64MB ■ 1.51GB hard drive ■ 10.4" active-matrix SVGA color display ■ 33.6K bps internal data/fax modem

$3369.46 CDW 90354

Portege 660CDT ..... **$3899.63** CDW 77243

■ 150MHz Intel Pentium® processor ■ 16MB RAM ■ 1.2GB hard drive ■ 10X CD-ROM drive ■ 11.3" active-matrix color display

COMPUTER DISCOUNT WAREHOUSE™

800-326-4239

CDW is the #1 mail-order reseller of Toshiba products!

www.cdw.com/pcy

©1997 CDW Computer Centers, Inc.
200 N. Milwaukee Avenue, Vernon Hills, IL 60061

with the portable computing leaders

FUJITSU

LifeBook 600 Series

The ultralight design for a mobile world

- 133MHz (635Tx) or 150MHz (655Tx, 656Tx) Intel Pentium® processor with MMX technology
- 16MB EDO RAM standard, expandable to 80MB
- 1.3GB (655Tx) or 2GB (635Tx, 656Tx) hard drive
- 8X (655Tx) or 16X Max (635Tx, 656Tx) CD-ROM drive in Enhancement Unit
- 12.1" SVGA active-matrix color display
- Internal 33.6K bps data/fax modem

635Tx ..... **$3199.00** CDW 92058
- 133MHz Intel Pentium® processor with MMX technology
- 2GB hard drive
- 16X CD-ROM drive

655Tx ..... **$3799.00** CDW 85013
- 150MHz Intel Pentium® processor with MMX technology
- 1.3GB hard drive
- 8X CD-ROM drive

656Tx ..... **$4299.00** CDW 92061
- 150MHz Intel Pentium® processor with MMX technology
- 2GB hard drive
- 16X CD-ROM drive

IBM Business Partner

CDW is the #1 mail-order reseller of IBM products!

EDITORS' CHOICE

IBM ThinkPad 380 Series

IBM ThinkPad 760 Series

IBM ThinkPad 380 Series

Model	CPU	RAM	Hard drive	CD-ROM	Color display	Price	CDW
380	150MHz Pentium	16MB	1.08GB	Optional	12.1" dual scan	$1699.46	86302
380D	150MHz Pentium	16MB	1.35GB	8X	12.1" dual scan	$1999.50	86304
380D	150MHz Pentium MMX	16MB	2.1GB	8X	12.1" active matrix	$3287.43	86305

IBM ThinkPad 760 Series

price drop!

Model	CPU	RAM	Hard drive	CD-ROM	Color display	Price	CDW
760ED	133MHz Pentium	16MB	2.1GB	6X	12.1" active matrix	$3739.72	74862
760E	150MHz Pentium	16MB	2.1GB	Optional	12.1" active matrix	$3578.40	74863
760XL	166MHz Pentium MMX	16MB	2.1GB	Optional	12.1" active matrix	$3769.88	84102
760XL*	166MHz Pentium MMX	32MB	2.1GB	Optional	12.1" active matrix	$4064.04	84103
760XD	166MHz Pentium MMX	32MB	3GB	8X	12.1" active matrix	$4679.37	84101

*Includes Windows NT Workstation V4.0

"Check out these HOT BUYS!"

3Com EtherLink III LAN PC Card

$119.10 CDW 85025

COMPAQ

The Compaq Armada Series is an exceptional value featuring high-performance Intel Pentium® processors, large-capacity hard drives, full-sized keyboards and bright color displays. It's a winning combination of fabulous features and legendary Compaq quality!

CDW is the #1 mail-order reseller of Compaq products!

price drop!

Compaq Armada 1500 Series

Model	CPU	RAM	Hard drive	CD-ROM	Color display	Price	CDW
1530DM	133MHz Pentium MMX	16MB	1.4GB	10X	12.1" dual scan	$2499.00	91507
1550DMT	133MHz Pentium	16MB	1.4GB	10X	12.1" active matrix	$2999.00	87070
1580DMT	150MHz Pentium MMX	16MB	2.1GB	10X	12.1" active matrix	$3499.00	90959

price drop!

Compaq Armada 7300 Series

Model	CPU	RAM	Hard drive	Color display	Modem	Price	CDW
7330T	150MHz Pentium MMX	16MB	2.1GB	12.1" active matrix	—	$3799.00	93735
7350MT	166MHz Pentium MMX	32MB	2.1GB	12.1" active matrix	33.6K bps	$4499.00	93736

price drop!

Compaq Armada 7700 Series

Model	CPU	RAM	Hard drive	Color display	Modem	Price	CDW
7710MT	150MHz Pentium MMX	16MB	1.6GB	12.1" active matrix	33.6K bps	$3699.00	88242
7730MT	166MHz Pentium MMX	32MB	2.1GB	12.1" active matrix	33.6K bps	$4399.00	88241
7750MT	166MHz Pentium MMX	32MB	2.1GB	12.1" active matrix	33.6K bps	$4999.00	88240

SmartSuite 97 Lotus SmartSuite® upgrade For Windows 95 and NT

$129.99 CDW 84104

CDW offers custom configuration at no extra charge

800-326-4239

www.cdw.com/pcs

CDW

CDW COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.

CDW: the best

COMPUTER DISCOUNT WAREHOUSE

HEWLETT PACKARD

HOT BUY!

Includes HP Color Kit, a $38 value!

HP DeskJet 340 Portable Inkjet Printer

The printer that makes anyplace your workplace!

- Sharp 600 x 300 dpi monochrome output
- 3 ppm fast, high-quality black printing
- 2-4 mpp full color graphics
- Parallel interface, 48KB input buffer
- Streamlined, lightweight 4.3 lbs—fits easily into a briefcase
- HP C2655A

$279.28 CDW 60751

Xircom CreditCard Ethernet 10/100+Modem 56*

- Auto-negotiaton of 10 and 100Mbps networks
- Flash upgradeable to future 56K ITU standard
- Digital Shield™ protects against high current digital phone lines
- Cellular upgradeable with optional cable, sold separately
- Global Access–international certification
- Optional MiniDock™ connector

CreditCard Ethernet 10/100+Modem 56 10T/100TX	$317.83	CDW 88828
CreditCard Ethernet 10/100+Modem 56 w/ MiniDock 10T/100TX	$319.08	CDW 88829
CreditCard Ethernet 10T/100-TX	$149.24	CDW 78929
CreditCard Ethernet 10T, upgradeable to 100-TX	$136.40	CDW 71046
CardBus Ethernet 10/100 32-bit adapter	$149.24	CDW 77620
CreditCard Modem 33.6	$179.79	CDW 75702

** With K56Flex technology, FCC regulations currently limit download speeds of service providers' modems to 53K bps*

3Com EtherLink III

- Connects at higher speeds more often
- Quicker system response, faster data transfers—up to 46% faster than the competition
- Plug and Play (PnP) compatible under Windows 95
- Cellular-ready (LAN+33.6 Modem only)
- Guaranteed compatibility with leading notebooks or your money back within one year of purchase
- Lifetime warranty

LAN+33.6 Modem PC Card	$299.30	CDW 85705
LAN+33.6 Modem PC Card-Combo	$338.38	CDW 86725
LAN PC Card-TP (HOT BUY!)	$119.10	CDW 82925
LAN PC Card-Combo	$174.13	CDW 81978
10/100 16-bit PC Card	$169.09	CDW 87717
10/100 Card Bus adapter	$147.57	CDW 87723

PC MAGAZINE EDITORS' CHOICE August 1996 3COM EtherLink III LAN Plus Modem

U.S. Robotics XJ1560 56K bps PC Card modem with XJACK connector

The Intelligent Choice in Information Access

New x2™ Technology provides up to 56K bps download data speeds over standard analog phone lines (current regulations limit download speeds to 53K bps). More than 350 Internet service providers with 16 million subscribers support x2, including AOL, CompuServe and Prodigy.

- Built-in XJACK connector saves you cable-carrying hassles
- Smart Battery Saver allows notebook to work longer between battery charges
- Digital Line Guard protects modem from high-voltage digital/PBX lines
- Intelligent Auto Install guides you through auto installation in a matter of minutes
- Free easy-to-use data/fax software for Windows

$229.21 CDW 87320

PC Card Solutions

56K Communicator

- Cellular ready (with optional direct connect cable)
- K56Flex
- Connects 56K bps and V.34 33.6K bps
- 14.4K bps fax
- MNP10-EC cellular error control technology
- Voicemail and automated paging
- Includes Cheyenne BitWare for Windows and AOL

$157.06 CDW 89709

33.6 Communicator with SimpleJack

- Direct-connect in-line RJ-11 phone connector
- Flash upgradeable
- 33.6K bps Data (V.34bis/V.FC)
- 14.4K bps fax
- Cellular ready (with optional connector cord)
- MNP10-EC
- TX-CEL 3 Voice recording (with integrated sound)
- Includes Cheyenne BitWare for Windows

TX-CEL

$145.42 CDW 75280

33.6 Communicator (HOT BUY!) $132.99 CDW 78429

Every Simple Technology product is tested for 100% compatibility and is backed with a lifetime warranty.

LIFETIME WARRANTY

www.simpletech.com

Each Simple Technology removable hard drive is pre-formatted with Ontrack Disk Manager (software included). Data transfer rate: 16.6Mbps. Guaranteed for one full year

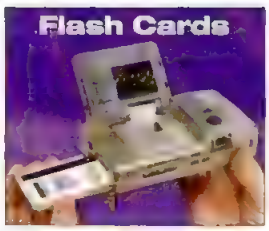
Model	Hard drive capacity 1.44GB	2.1GB	3.09GB
IBM ThinkPad 355, 360, 750, 755	$368.75 87497	$530.02 71582	$707.14 88867
IBM ThinkPad 760, C, CD, L, LD	$368.75 87498	$530.02 86087	—
Toshiba T4700, T4800, T4850	$368.75 87501	—	—
Toshiba T700, T710, T720	$368.75 87502	$458.14 71588	$707.14 89072
NCR Safari 3181 4/50, 3182 4/75	$368.75 87499	$530.02 71587	$707.14 88869
AT&T Globalyst 250	$368.75 87500	$530.02 71587	$707.14 88869
NEC Versa 2000, 4000	$368.75 87500	$530.02 82848	—
NEC UltraLite, Versa E, V, M, P	$368.75 87499	$530.02 71587	$707.14 88869
Compaq LTE 5000, 5100, 5200, 5300, 5400	$368.75 87498	$458.43 71576	$707.14 88865

WORLDWIDE WEB

TECH SUPPORT 1-800-367-7330 x4

FAX-ON-DEMAND 1-800-429-5626 x580

Simple TECHNOLOGY



Digital "Film" for Your Digital Camera

ATA Flash PC Cards

4MB ATA Memory	$98.43	66564
8MB ATA Memory	$124.37	66560
12MB ATA Memory	$176.69	66561
16MB ATA Memory	$227.29	66563
32MB ATA Memory	$439.89	73712

Up to 40MB available

Compatible with Casio Cassiopeia-HPC, QV-300, QV-120A Canon Powershot 600, Epson PhotoPC 500, Kodak DC120, DC25, DC20, DC50, Minolta RD-75, Polaroid PDC 2000/40, Ricoh RDC-2, RDC-2E, NEC MobilePro

CompactFLASH

4MB Memory	$81.05	72849
8MB Memory	$125.56	81022
Flash card adapter	$26.75	72851
Flash card adapter with 4MB	$97.81	89653
Flash card adapter with 8MB	$139.06	89654

Compatible with Canon Powershot 350, Kodak DC25, DC120

800-326-4239

CDW®: 100% pure customer service!

www.cdw.com/pt9

©1997 CDW Computer Centers, Inc.
200 N. Milwaukee Avenue, Vernon Hills, IL 60061 PCMDEB 10797

brand names at the best prices!

CLARIS

FileMaker Pro V4.0

For Windows V3.1, NT and 95

FileMaker Pro V4.0 is the easiest way to manage information–from desktop to the web. Instant Web Publishing allows FileMaker Pro databases to be viewed with web browsers. And built-in CGI tools and compatibility with Claris Home Page V3.0 make it easy to tie interactive databases to your web site.

Upgrade

$109.12 CDW 92032

Full Version

$219.71 CDW 92033

matrox

Rainbow Runner Studio

An exciting new universe of digital video

■ High-quality video editing on the PC ■ Live video conferencing over the net ■ PC to TV video output ■ Hardware MPEG1 video playback ■ 'PC-VCR' video capture and image editing ■ Video upgrades for Matrox Mystique®, Mystique® 220, Mystique® 220 Business and Millennium II (coming soon!)

$235.44 CDW 83834

APC

Back-UPS Pro Plug and Play

FREE software!

■ Automatic Voltage Regulation for brownout and overvoltage correction ■ Full-time surge and noise suppression ■ Modem/10BASE-T surge suppression ■ User-replaceable, hot-swappable batteries ■ Also supports Windows, Windows NT, and OS/2 ■ Free PowerChute Pro for Windows 95 software provides graceful, unattended shutdown of Windows 95-based workstations ■ 2-year warranty

280PNP, 280VA output

$146.86 CDW 83660

420PNP, 420VA output

$239.25 CDW 84625

650PNP, 650VA output

$294.06 CDW 84626

WINDOWS® AND DOS® SOFTWARE

Intuit Quicken Deluxe V6.0 WIN CD	56.55
Lotus 1-2-3 V4 0 DOS	389.16
Lotus 1-2-3 V4 0 DOS upg	84.44
Lotus 1-2-3 V5 0 WIN	399.42
Lotus 1-2-3 V5 0 WIN spec upg	93.52
Lotus Approach V3 0 WIN	92.58
Lotus cc Mail Mobile V6 0 WIN	126.14
Lotus cc Mail V2 2 Mobile WIN	126.18
Lotus cc Mail V6 1 System Pack univ CD	126.77
Lotus cc Mail V6.1 System Pack upg CD	82.63
Lotus Freelance V2 1 WIN	319.90
[illegible]	89.48

Microsoft Windows 95 with Internet Explorer Starter Kit

Upg. CD $96.01

Full version $184.65

[illegible]	92.20
Fontographer 4 WIN CD	316.35
Mathsoft Mathcad V6 0 WIN	99.26
MetaTools KPT Convolver V1 0 WIN	129.00
Norcom Carbon Copy V6 1 DOS	109.98
Microsoft Encarta 97 WIN95 CD	43.82
Microsoft Encarta 97 World Atlas CD	43.73
Microsoft Flight Simulator V5 1 DOS	39.20
Microsoft Flight Simulator V5 1 w/scenery DOS CD	49.88
Microsoft MS-DOS V6.22 upg	48.50
Microsoft Project V4 0 WIN	417.09
Microsoft Project V4.0 WIN vers upg	129.65
Microsoft Visual Basic V5 0 Learning CD	89.77
Microsoft Windows V3 11	91.88
Microsoft Windows V3 11 upg	49.86
NCD PC Xwars WIN upg	77.76
NewSoft ViewOffice PowerSuite WIN CD	45.07
Peachtree Complete Accounting V3.5 CD	179.28
PowerQuest Partition Magic V3.0 CD	56.08
ProCD SelectPhone 1997 CD	43.22
ProCD SelectStreet Atlas 1997 CD	39.44
Quarterdeck WebAuthor V2 0/MS Word WIN	81.96
Sierra Print Artist V4 0 WIN CD	33.81
Softkey Calendar Creator V4 0 WIN	39.99
Symantec ACT! Mobile Link V2 0 WIN	234.84
Symantec ACT! V2 0 WIN	169.17
Symantec AntiVirus V2 0 WIN NT	53.87
Symantec Disklock V3 5 WIN	78.53
Symantec Norton AntiVirus V3 0 DOS/WIN	48.46
Symantec Norton NT Tools V1 0 WIN NT CD	41.81
Symantec Norton Utilities V8 0 DOS/WIN	87.29
Symantec pcANYWHERE V2 0 WIN	119.58
Symantec pcANYWHERE V2 0 WIN host	89.44
Symantec pcANYWHERE V2 0 WIN remote	79.82
Symantec pcANYWHERE V5 0 DOS	119.58
Symantec pcANYWHERE V5 0 DOS host	81.58
Symantec pcANYWHERE V5 0 DOS remote	79.00
Symantec WinFAX PRO V4 0 WIN CD	93.52

WordPerfect Suite 7 For Windows V3.1x

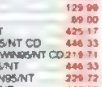
Upg. CD $139.47

CD $244.11

CorelDRAW! V5.0 from V4 0 WIN upg CD	89.78
CorelDRAW! V5 0 WIN CD	179.46
Fractal Design Dabbler V2 0 WIN	39.97
Fractal Design Expression Companion Upg WIN CD	127.90
Fractal Design Painter V4 0 WIN	334.58
Fractal Design Painter V4 0 WIN upg	118.07
GoldMine V2 5 WIN	169.23
id Software DOOM II CD	35.49

WINDOWS® 95 SOFTWARE

Adobe Acrobat V3 0 WIN/95/NT CD	185.78
Adobe Illustrator V7 0 comp upg WIN95/NT CD	267.45
Adobe Illustrator V7 0 upg WIN95/NT CD	89.87
Adobe Illustrator V7 0 WIN95/NT CD	368.17
Adobe PageMaker V6.5 WIN95/NT CD	549.29
Adobe PageMaker V6.5 WIN95/NT upg	89.87
Adobe PageMill V2.0 WIN95 3.5/CD	92.98
Adobe Photoshop V4.0 WIN/95/NT CD	549.29
Adobe Photoshop V4 0 WIN/95/NT upg CD	159.58



Microsoft Publisher 97 $20 rebate

Create high-impact publications in a few easy steps

$49.00* CDW 75069

*After $20 mail-in manufacturer rebate. Offer ends 10/31/97

Adobe Type Manager Deluxe V4 0 WIN95 CD	62.37
Borland Delphi Pro V3 0 WIN95 comp upg	249.80
Casere OmniForm V2 0 WIN95	129.11
Casere OmniForm V2 0 WIN95	129.11
Casere OmniPage Pro V7 0 WIN95	469.90
Casere OmniPage Pro V7 0 WIN95 vers upg	109.82
Cheyenne Backup V2 0 WIN95 CD	65.53
Ciere FileMaker Pro V3 0 WIN/95/NT CD	176.61
Ciere FileMaker Pro V3 0 WIN/95/NT upg	89.92
Corel Office Pro V7 0 WIN95	278.39
Corel Office Pro V7 0 WIN95 comp/vers upg	188.85
Corel WebMaster Suite WIN95/NT CD	185.63
Corel WordPerfect Suite 8 WIN95/NT CD	279.78
Corel WordPerfect Suite 8 WIN95/NT CD upg	135.23
[illegible]	91.23
[illegible]	91.23
Corel WordPerfect Suite 7 WIN95 upg CD	89.78
CorelDRAW! 7 WIN95/NT CD	437.49
CorelDRAW! 7 WIN95/NT upg CD	224.73
Fractal Design Painter V5.0 upg WIN95/NT CD	89.36
GoldMine V3.2 WIN95	169.00
[illegible]	94.75
Lotus 1-2-3/97 upg WIN95/NT 3.5	94.47
Lotus Organizer97 WIN95 CD	71.27
Lotus SmartSuite97 upg WIN95/NT CD	139.60
Macromedia Flash 2 WIN95/NT CD	185.78
McAfee VirusScan Deluxe V3 0 WIN/95/NT/DOS	54.90
McAfee VirusScan Security Suite WIN95/NT	74.78
McAfee VirusScan V3 0 WIN/95/NT/DOS/OS2	46.46
Metasolx Kai's Photo Soap WIN95/NT CD	42.18
Microcom Carbon Copy V3 0 WIN95	91.34
Microsoft Access 97 WIN95/NT CD	298.83
Microsoft Access 97 WIN95/NT upg CD	93.98
Microsoft Automap Streets Plus 1997 Deluxe CD	35.02
Microsoft Bookshelf 98 WIN95/NT CD	43.73
Microsoft Encarta 97 Encyclopedia Deluxe	67.18
Microsoft Excel 97 WIN95/NT CD	298.83
Microsoft Excel 97 WIN95/NT upg CD	93.98
Microsoft FrontPage 97 w/Bonus Pack WIN95/NT CD	134.90
Microsoft FrontPage 97 w/Bonus Pack WIN95/NT upg CD	48.37
Microsoft Greetings Workshop WIN95 CD	24.50
Microsoft Money 97 WIN95 CD	29.24
Microsoft Office 97 Pro Upg w/Bkshf & Intellimouse CD	334.51
Microsoft Office 97 Pro w/Bkshf WIN95 CD upg	308.30
Microsoft Office 97 Pro w/Bkshf WIN95/NT CD	329.80
Microsoft Office 97 Pro w/Bkshf/QuickView	[illegible]
WIN95 CD upg	309.66
[illegible]	449.52
Microsoft Office 97 Sm Business Edition WIN95 CD upg	224.29
Microsoft Office 97 Std WIN95/NT CD	445.21
Microsoft Office 97 Std WIN95/NT upg CD	218.13
Microsoft Outlook 97 WIN95/NT CD	93.98
Microsoft Plus! WIN95 CD	43.91
Microsoft PowerPoint 97 upg WIN95/NT CD	93.98
Microsoft Project V4 1 WIN95 CD	424.42
Microsoft Project V4 1 WIN95 upg CD	129.99
[illegible]	89.00
Microsoft Team Manager 97 WIN95/NT	425.17
Microsoft Visual Basic Pro V4 0 WIN/95/NT CD	446.33
Microsoft Visual Basic Pro V5 0 comp upg WIN95/NT CD	219.71
Microsoft Visual Basic Pro V5 0 WIN95/NT	446.33
Microsoft Visual C++ Pro V5 0 upg WIN95/NT	229.72
Microsoft Visual C++ Pro V5 0 WIN95/NT	446.33
Microsoft Visual J++ Pro WIN95/NT CD	84.01
Microsoft Visual Studio 97 Pro upg WIN95/NT CD	445.22
Microsoft Windows 95 w/Internet Explorer	184.65
Microsoft Windows 95 w/Internet Explorer upg	97.58
Microsoft Windows 95 w/Internet Explorer upg CD	86.01
Microsoft Windows NT Workstation V4.0 CD	269.94
Microsoft Windows NT Workstation V4 0 upg CD	229.98
Microsoft Word 97 WIN95/NT CD	298.83
Microsoft Word 97 WIN95/NT upg CD	75.18
MS Windows NT Workstation V4 0 vers upg CD	129.52
PowerQuest DriveCopy WIN/95/NT/DOS	27.30
Quark QuarkXPress V3.32 WIN95/NT	599.75
Quarterdeck Clean Sweep V3 0 WIN/95/NT	34.79
Quarterdeck Procomm Plus V4 0 WIN95 CD	127.74
Stac ReachOut V7 0 host/viewer 3.5	119.88
Symantec ACT! V3 0 WIN95/NT	169.21
Symantec ACT! V3 0 WIN95/NT upg CD	81.86
Symantec Norton AntiVirus V2 0 WIN95	63.87
Symantec Norton Utilities V2.0 upg WIN95 CD	46.46
Symantec Norton Utilities V2 0 WIN95 CD	87.29
Symantec Norton Your Eyes Only WIN95	71.85
Symantec pcANYWHERE V7 5 WIN95/NT upg	78.97
Symantec pcANYWHERE32 V7 5 WIN95/NT	119.99
Symantec WinFax PRO V8.0 WIN95/NT	93.52
Traveling Software Laplink V7 5 WIN95	129.32
Visio Professional V4 5 WIN95/NT CD	298.02
Visio Technical V4 5 WIN95/NT CD	297.10
Visio V4 0 WIN95 3.5/CD	129.43
Xerox Page PRO97 WIN95/NT CD	94.53

800-294-4239

CDW's Volume Software Licensing Department

Call! for a competitive quote on your volume licensing needs!

EPSON

Stylus Color 800

■ 4-color (CMYK) drop-on demand Micro Piezo ink jet print technology ■ 1440 x 720 dpi photo quality color and laser quality black text on premium paper ■ 720 x 720 dpi photo quality color and laser quality black text on plain paper ■ Print speeds: up to 8 ppm black; up to 7 ppm color ■ Printer language: ESC/P 2, IBM X24E, optional Adobe PostScript Level 2 ■ Optional internal Ethernet and LocalTalk ■ 2-year limited warranty

$399.00 CDW 80666

U.S. Robotics

Sportster 56K Faxmodem With 56K bps x2 Technology

■ **Includes:** Sportster 56K* faxmodem, RJ11 phone cord, AC adapter (external), U.S. Robotics Connections™ CD-ROM with fax/communications software, Internet access software and more than 30 software programs and special offers

Internal

$197.99 CDW 81423

External

$217.99 CDW 81424

**Sportster 56K Faxmodems are capable of 56K bps downloads, however current regulations limit download speed to 53K bps*

CHEYENNE

ARCserve 6 For Windows NT

ARCserve 6 for Windows NT and its storage options provide a scalable solution to meet your critical data storage management needs. This multitasking data management software solution offers advanced capabilities such as centralized administration, remote management and intelligent alert notification. Plus, it's designed to backup and restore data across single or multi-site Windows NT enterprises.

Workstation edition

$169.82 CDW 73299

Single server edition

$449.87 CDW 72681

Enterprise edition

$819.18 CDW 71980

"Check out these HOT BUYS!"

MAG

710V 17" color monitor

$459.70 CDW 79031

HEWLETT PACKARD

HP LaserJet 6MP printer

$859.55 CDW 74908

If you find a better price, call CDW before you buy!

800-326-4239

©1997 CDW Computer Centers, Inc.

COMPAQ

Deskpro 2000 Series

Affordable, manageable desktop PCs for business environments

■ Intel Pentium® processors with MMX technology ■ 256KB Level 2 cache ■ 16MB or 32MB SDRAM standard ■ 2.1GB or 3.2GB S.M.A.R.T. EIDE hard drives ■ CDS models include internal 16X Max EIDE CD-ROM drive and Enhanced Business Pro Audio ■ Integrated S3/V2 enhanced 64-bit graphics ■ 1MB SGRAM standard, expandable to 2MB ■ Expansion slots: two PCI; one shared PCI/ISA; two ISA ■ Ports: serial; ECP parallel; two USB; keyboard; mouse; video ■ Microsoft Windows® 95 ■ Intelligent Manageability ■ 3-year parts, 1-year labor and on-site repair warranty

Monitor sold separately

AS LOW AS $879.00 CDW 72608

Compaq Deskpro 2000 series

Desktop	CPU	RAM	Hard drive	CD-ROM	Price	CDW
5166X/2100	166MHz Pentium MMX	16MB	2.1GB	-	$1199.00	92269
5166X/3200	166MHz Pentium MMX	16MB	3.2GB	-	$1309.00	92838
5200X/2100	200MHz Pentium MMX	16MB	2.1GB	-	$1389.00	92840
5200X/3200	200MHz Pentium MMX	32MB	3.2GB	-	$1579.00	92841
5233X/3200/CDS	233MHz Pentium MMX	32MB	3.2GB	16X Max	$1949.00	92843
Mini-tower	**CPU**	**RAM**	**Hard drive**	**CD-ROM**	**Price**	**CDW**
5166X/3200CDS	166MHz Pentium MMX	32MB	3.2GB	16X Max	$1619.00	92839
5200X/3200/CDS	200MHz Pentium MMX	32MB	3.2GB	16X Max	$1769.00	92842

CDW is the #1 mail-order reseller of Compaq products!

Deskpro 4000 Series

Network-ready, optimal performance

■ Intel Pentium® processors with MMX technology and Pentium II processors ■ 512KB Level 2 cache ■ 16MB or 32MB SDRAM standard ■ 2.4GB or 3.2GB S.M.A.R.T. Ultra ATA hard drives ■ CDS models include internal 16X Max EIDE CD-ROM drive and Enhanced Business Pro Audio ■ Integrated S3ViRGE/GX enhanced 64-bit graphics controller with 3D acceleration ■ 2MB SGRAM standard ■ Expansion slots: two PCI; one shared PCI/ISA; two ISA (MMX models), three PCI; one ISA; one PCI/ISA (Pentium II model) ■ Expansion slots (mini-towers): four PCI; three ISA ■ Ports: 2 serial; ECP parallel; 2 USB; keyboard; mouse; video; RJ-45; infrared; audio input/output (CDS models only) ■ Integrated Netelligent 10/100 TX Ethernet controller ■ Microsoft Windows® 95 or Windows NT Workstation V4.0 (Pentium II models) ■ Included software: Insight Personal Edition; Enhanced Intelligent Manageability; Diagnostics for Windows Utility ■ 3-year parts, 1-year labor and on-site repair warranty

Monitor sold separately

Compaq Deskpro 4000 series

Desktop	CPU	RAM	Hard drive	CD-ROM	Price	CDW
5166X/2400	166MHz Pentium MMX	16MB	2.4GB	-	$1389.00	92844
5166X/3200	166MHz Pentium MMX	32MB	3.2GB	-	$1599.00	92845
5200X/2400	200MHz Pentium MMX	32MB	2.4GB	-	$1689.00	92847
5200X/3200	200MHz Pentium MMX	32MB	3.2GB	-	$1759.00	92848
5233X/3200X/CDS	233MHz Pentium MMX	32MB	3.2GB	16X Max	$2129.00	92849
6233X/2500/CDS	233MHz Pentium II	32MB	2.5GB	16X Max	$2319.00	88475
Mini-tower	**CPU**	**RAM**	**Hard drive**	**CD-ROM**	**Price**	**CDW**
5166X/3200/CDS	166MHz Pentium MMX	32MB	3.2GB	16X Max	$1799.00	92846

Deskpro 6000 Series

Performance and networking for power computing environments

■ Intel Pentium II and Pentium Pro processors ■ 512KB Level 2 cache (Pentium II); 256KB L2 cache (Pentium Pro) ■ 32MB or 64MB EDO RAM standard ■ 2.15GB or 4.2GB Ultra SCSI hard drives ■ PDS models include: internal SCSI PD-CD drive; Enhanced Business Pro Audio ■ CDS models include: internal 8X IDE CD-ROM drive; Enhanced Business Pro Audio; Windows Sound System V2.0 ■ Matrox Millennium graphics controller ■ 2MB WRAM standard ■ Expansion slots: three PCI; one shared PCI/ISA; one ISA ■ Expansion slots (mini-towers): four PCI; three ISA ■ Ports: two serial; ECP parallel; keyboard; mouse; video; RJ-45, infrared; audio input/output (CDS, PDS models only) ■ Integrated 10BASE-T Ethernet controller; upgradeable with optional 100BASE-TX UTP Module ■ Operating system: Microsoft Windows NT Workstation V4.0 CD-ROM ■ Included software: Insight Personal Edition; Enhanced Intelligent Manageability; Diagnostics for Windows Utility ■ 3-year parts, 1-year labor and on-site repair warranty

Compaq Deskpro 6000 series

Desktop	CPU	RAM	Hard drive	CD-ROM	Price	CDW
6200/2150/CDS	200MHz Pentium Pro	32MB	2.15GB	8X	$2459.00	72786
6200/4200/PDS	200MHz Pentium Pro	32MB	4.2GB	PD-CD Drive	$2789.00	84268
6233X/2150/PDS	233MHz Pentium II	32MB	2.15GB	PD-CD Drive	$2629.00	88473
6266X/4200/CDS	266MHz Pentium II	32MB	4.2GB	8X	$3179.00	88474
Mini-tower	**CPU**	**RAM**	**Hard drive**	**CD-ROM**	**Price**	**CDW**
6200/4200/PDS	200MHz Pentium Pro	64MB	4.2GB	PD-CD Drive	$3099.00	84271

800-326-4239

CDW offers FREE configuration of your new PC purchase!

www.cdw.com/pcy

value-priced computing solutions

TOSHIBA

CDW is the #1 mail-order reseller of Toshiba products!

Equium Series PCs

A complete personal computing solution

The Toshiba Equium series is designed to lower the total cost of PC ownership while providing stability of components, reliability and a rich feature set of relevant technology. All systems feature Intel Pentium processors, Universal Serial Bus, 12X CD-ROM, 3D video, a Windows® 95 keyboard and a three-button mouse. All systems are DMI 2.0 compliant and include Intel's LANDesk Client Manager software. It's everything you need in a personal computing solution and more.

Monitor sold separately

Toshiba Equium systems

Desktop	CPU	RAM	Hard drive	CD-ROM	Price	CDW
5160D	166MHz Pentium MMX	32MB	2.07GB	12X	$1418.82	84248
5200D	200MHz Pentium MMX	32MB	2.38GB	12X	$1549.64	84249
6200D	200MHz Pentium Pro	32MB	2.95GB	12X	$2118.60	84251
Mini-tower	**CPU**	**RAM**	**Hard drive**	**CD-ROM**	**Price**	**CDW**
6200M	200MHz Pentium Pro	32MB	4.24GB	12X	$2479.47	84252
6260M	266MHz Pentium II	32MB	3.73GB	16X	$2569.07	93106

HEWLETT® PACKARD

CDW is the #1 mail-order reseller of Hewlett Packard products!

HP Vectra VL Series 5 PC

Advanced manageability

HP Vectra VL Series 5 PC combines value pricing with advanced performance and upgradeability, along with a host of features tailored to suit all the office needs of your business.

price drop!

Monitor sold separately

HP Vectra VL Series 5 PC

Desktop CPU	RAM	Hard drive	CD-ROM	Price	CDW
166MHz Pentium	16MB	1.6GB	—	$1166.30	85717
166MHz Pentium MMX	16MB	2.5GB	8X	$1377.09	91115
200MHz Pentium	32MB	2.5GB	8X	$1449.60	86511
200MHz Pentium MMX	32MB	2.5GB	8X	$1598.63	91119
233MHz Pentium MMX	16MB	2.5GB	—	$1598.12	91120
Mini-tower CPU	**RAM**	**Hard drive**	**CD-ROM**	**Price**	**CDW**
133MHz Pentium	16MB	1.6GB	—	$1219.44	86523
166MHz Pentium	16MB	2.5GB	—	$1229.50	86527
166MHz Pentium MMX	16MB	2.5GB	8X	$1439.22	91121
166MHz Pentium	32MB	2.5GB	8X	$1519.54	86421
200MHz Pentium	16MB	2.5GB	8X	$1395.28	84733
233MHz Pentium MMX	32MB	4GB	—	$1889.76	91123

IBM PC 300GL Series

A perfect combination of price and performance

IBM PC 300GL Series computers offer Intel® Pentium® processors, large capacity 1.2GB or 2.5GB hard drives, fast 64-bit PCI graphics and Windows 95 or Windows NT Workstation V4.0 on select models.

- Intel Pentium or Pentium MMX processors
- 256KB pipeline burst Level 2 cache
- SDRAM memory
- Expansion slots: one PCI, one ISA, two shared PCI/ISA
- Four bays (two available)
- Two USB ports
- 1-year, on-site limited warranty (3 years parts)

IBM Business Partner

Monitors sold separately

IBM PC 300XL Series

IBM PC 300XL Series computers take advantage of the new Intel Pentium® II processor with MMX technology for unparalleled system performance. The PC 300XL Series incorporates the latest technology including infrared, Universal Serial Bus (USB), SMART EIDE hard drives, 10/100 Ethernet and 16X Max (variable speed) CD-ROM drives. All IBM PC 300XLs ship with either Microsoft NT Workstation V4.0 or Windows 95, Lotus SmartSuite license, TME-10 NetFinity, Intel LANDesk for Windows NT and more!

- Intel Pentium II MMX processor
- 512KB Level 2 cache
- S3 Trio V2 graphics with 2MB EDO video memory
- Five expansion slots and five bays
- Two USB ports
- 1-year limited warranty (3 years parts)

IBM PC 300GL Series

CPU	RAM	Hard drive	CD-ROM	Price	CDW
166MHz Pentium	16MB	1.2GB	—	$999.63	85188
166MHz Pentium	16MB	2.5GB	—	$1109.18	85190
166MHz Pentium	16MB	2.5GB	16X	$1366.50	85189
166MHz Pentium MMX*	32MB	2.5GB	—	$1419.28	85405

*Includes Windows NT Workstation V4.0

CDW is the #1 mail-order reseller of IBM products

IBM PC 300XL Series

CPU	RAM	Hard drive	CD-ROM	Price	CDW
233MHz Pentium II	32MB	2.5GB	16X Max	$2296.14	86313
233MHz Pentium II*	32MB	2.5GB	—	$1999.36	86314
266MHz Pentium II	32MB	4.2GB	16X Max	$2658.12	86315
266MHz Pentium II	32MB	4.3GB**	16X Max	$2960.24	86316

*Includes Windows 95 **Wide-Ultra SCSI

"Check out this Special Purchase!"

Buy any computer and pick up Symantec's Norton Utilities under Home Addition for HALF-PRICE!

$33.00

$34.09

CDW offers competitive business equipment leases

800-326-4239

www.cdw.com/pcg

©1997 CDW Computer Centers, Inc.

CIRCLE 109 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

PCMAG.COM 2 9 7 208 N. Milwaukee Avenue, Vernon Hills, IL 60061

CDW COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.

CDW is your

COMPUTER DISCOUNT WAREHOUSE™

Novell.
Everything's Connected.

IntranetWare

IntranetWare is NetWare V4.11 and more!

IntranetWare™ is a full-service intranet platform that offers all of the advantages of NetWare V4.11 and provides advanced intranet and Internet capabilities. In addition, IntranetWare offers the Netscape Navigator Browser, FTP Services for NetWare, Novell's IPX/IP Gateway, and a multiprotocol router for WAN and Internet connections.

■ Use your IntranetWare server as a web server ■ View your multiserver network as a single, integrated system ■ Distribute the NDS database through partitioning and replication ■ Manage NetWare 3, NetWare 4, and IntranetWare servers using a single utility ■ Provides multiprotocol routing, including IPX/SPX, TCP/IP and AppleTalk ■ Provides integrated network management, including remote management ■ Includes a full-featured, easy-to-use online hypertext Help system

5-User	$739.47	CDW 75733
10-User	$1324.67	CDW 75736
25-User	$2328.46	CDW 75737
50-User	$3305.47	CDW 75738

Call a CDW account manager today for additive licensing and upgrades from NetWare V4.x!

intel

Express 10/100 Stackable Hub

new!

Intel's Express 10/100 Stackable Hub provides an easy and cost-effective transition to Fast Ethernet. It gives you the built-in flexibility of Intel's 10/100Mbps enabled adapters, print servers and switches in a shared hub.

■ Entire hub can be configured at either 10Mbps or 100Mbps ■ Stack up to eight units ■ Allows 10Mbps and 100Mbps operation in a single managed stack ■ 12-port allows for an expansion module for either a SNMP management module, a 100BASE-FX module or an additional 10/100 module

12-port	$999.00	CDW 87162
24-port	$1579.68	CDW 87165
Cascade cable	$55.82	CDW 59238
Network management module	$1227.74	CDW 67313
100BASE-FX fiber uplink module	$405.96	CDW 67312

HEWLETT® PACKARD

HP NetServer E40

The server your business can depend on

new!

Designed to meet the unique needs of self-supported workgroups, the HP NetServer E40 delivers true server performance and superior dependability at the price of a desktop PC. A multipurpose server optimized for connecting 25 nodes or less, the HP NetServer E40 enables improved productivity and efficiency, with ease and dependability built in at every level.

■ Intel Pentium® Pro processors ■ 256KB write-back Level 2 cache ■ PCI Fast SCSI-2 hard drive controller ■ Internal expansion slots: two PCI, two ISA, two shared PCI/ISA ■ Six expansion bays (four available) ■ Novell IntranetWare for Small Business ■ 1-year on-site warranty

HP NetServer E40

CPU	RAM	Hard drive	CD-ROM	Ethernet	Price	CDW
6/180	16MB	—	8X	10/100Mbps	$1719.09	91381
6/180	16MB	2.1GB	8X	10/100Mbps	$1999.58	91478
6/200	32MB	—	8X	10/100Mbps	$1949.66	91479
6/200	32MB	2.1GB	8X	10/100Mbps	$2284.17	91480

Seagate Software

Seagate Backup Exec V7.5 for NetWare

new!

A reliable, full-featured data protection solution for NetWare 4

Seagate Backup Exec for NetWare is one of the safest, most reliable solutions available today. With Storage Management Services (SMS) support, Backup Exec protects NetWare 3 and 4 servers, as well as future generations of NetWare. Backup Exec also ensures full data recovery by protecting all of your network data including objects, containers and schema extensions. Engineered to deliver full-featured network backup, Backup Exec keeps pace with your network's changing needs while maximizing your investment.

Single server edition	$429.88	CDW 94779
Unlimited users	$858.91	CDW 94778

800-326-4239

CDW : Brand names you know, prices you love

www.cdw.com/ptg

©1997 CDW Computer Centers, Inc.
200 N. Milwaukee Avenue, Vernon Hills, IL 60061 PCR2285X 110797

best place to buy networking

IBM Business Partner

new!

IBM PC Server 315

IBM PC Server 315 is a powerful entry business, mini-tower network server. It combines Pentium® Pro performance and substantial data storage capacity with ease of installation and system management. This combination of features provides a very affordable package designed to appeal to small business owners.

- Intel Pentium® Pro processors
- Includes 256KB write-back Level 2 cache
- 32MB ECC RAM standard expandable to 512MB
- PCI SVGA video with 1MB video memory
- Internal expansion slots one shared PCI/ISA; four PCI; two ISA
- Six expansion bays: three or four available (depending on configuration)
- Includes: PCI Wide Ultra SCSI hard drive controller
- 3-year warranty

IBM PC Server 315

CPU	RAM	Hard drive	CD-ROM	Ethernet	Price	CDW
200MHz Pentium Pro	32MB	—	8X	—	$2399.63	89310
200MHz Pentium Pro	32MB	2.1GB	8X	10/100Mbps	$2799.96	89311

Microsoft Windows NT Server V4.0

Windows NT reliability with the ease of use of Windows 95

1996 Winner MVP PC Computing

- Easy set-up, deployment, management and use
- One platform for your e-mail, file server, databases and communications
- Supports over 5000 hardware platforms
- Integrates seamlessly with your existing systems, including Novell NetWare®
- Built-in Internet, intranet and communications services
- Includes FrontPage and Internet Information Server
- Support for dial-up networking
- Supports any web browser

Server + 5 clients	$729.14	CDW 73221
Server + 10 clients	$1006.40	CDW 73222
Upgrade + 5 client licenses	$365.77	CDW 73214
Upgrade + 10 client licenses	$485.83	CDW 73218
Comp upgrade + 5 client licenses	$365.77	CDW 73215
Comp upgrade + 10 client licenses	$485.83	CDW 73217
Single client license, upgrade	$15.52	CDW 73209
Single client license	$29.96	CDW 73211

LINKSYS

EtherFast 4-Port 100BASE-TX Stackable Hub

The new 4-port 100BASE-TX stackable hub is the ideal solution for a cost effective move into Fast Ethernet. With built-in expandability, you can add more ports as business demands. Stack up to two hubs high with the included stacking cable. Uplink port provides access to other hubs or switches.

$179.71
CDW 81908

EtherFast 8-Port 100BASE-TX Hub $356.12 CDW 75596
- Eight 100BASE-TX ports; uplinkable

Fast Ethernet Starter Kit new! $239.39 CDW 94248
- Includes 4-port 100BASE-TX stackable hub, two 10/100 PCI cards and cabling

EtherFast 2-Port 10/100 Switch

Two auto-sensing 10/100 ports allow easy integration of 10BASE-T and 100BASE-TX. Simply attach your 10BASE-T hub(s) to port one, then your 100BASE-TX hub(s) to port two. Full duplex capable.

$264.43
CDW 90051

10BASE-T hubs & Network kit

5-port 5 10BASE-T ports, uplinkable	HOT BUY	$44.93	CDW 57807
10-port 9 10BASE-T ports + BNC, uplinkable		$88.19	CDW 70377
20-port 20 10BASE-T ports + BNC, uplinkable		$159.94	CDW 75530
16-port 16 10BASE-T ports + BNC, AUI, rackmount		$204.25	CDW 54746
Network Starter Kit 5-port hub, 2 PCI NICS, cabling		$106.60	CDW 83590

3Com

10/100 16-bit PC card
$169.09 CDW 87717

OfficeConnect

Compact, easy-to-use products that simplify small-office networking

This Ethernet-based product family provides a range of affordable, stackable units that combine simplicity of design and operation with advanced functionality and outstanding speed. As a result, everyone in your small office can take full advantage of the virtually instant information access made possible by e-mail, groupware and other powerful networked applications, not to mention Internet access.

Hub/TP4 4 RJ-45 ports		$68.46	CDW 82295
Hub/TP4 combo 4 RJ-45 ports, AUI and BNC		$99.23	CDW 82298
Hub/TPO8 8 RJ-45 ports	HOT BUY	$105.30	CDW 66411
Hub/TPC8 8 RJ-45 ports, 1 BNC port		$149.67	CDW 66409
Hub/TPM8 8 RJ-45 ports, SNMP management		$374.30	CDW 66410
Hub/TP16C 16 RJ-45 ports, AUI		$247.26	CDW 82299
Hub/8TP100 Fast Ethernet hub		$469.34	CDW 75414
Switch 140 Fast Ethernet to Ethernet switch		$689.95	CDW 76715
Remote 530 ISDN router		$1007.98	CDW 83400

"Check out these HOT BUYS!"

LINKSYS
NE2000 Combo Ethernet Adapter
$31.54
CDW 89240

3Com
Fast EtherLink XL 10/100 PCI
$84.31
CDW 71029

97% of CDW® credit-approved orders placed by 9pm ship same day!

800-326-4239

www.cdw.com/pcg

CDW

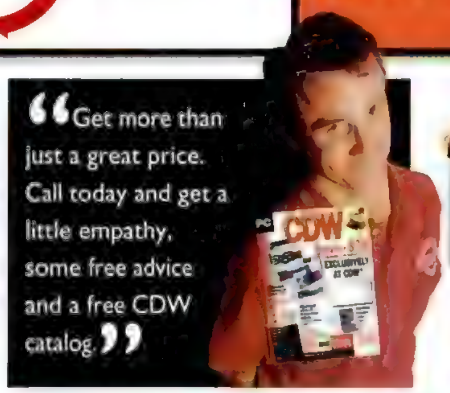
CDW COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.

™

We offer you

COMPUTER DISCOUNT WAREHOUSE



ViewSonic

G773
17" color monitor
■ 17" SuperClear™ with Microfilter™ flat square screen CRT, 16" viewable image size ■ 0.26mm dot pitch ■ Maximum resolution: 1280 x 1024, 1024 x 768 at 87Hz

$629.86 CDW 91078

P775 ..... **Call!** CDW 91079
■ 17" Super Contrast flat square screen CRT, 16" viewable image size ■ 0.25mm dot pitch ■ Maximum resolution: 1600 x 1280; 1280 x 1024 at 88Hz

macromedia

Director 6 Multimedia Studio
For Windows 95 and NT
Powerful tools for multimedia and the web
Director 6 Multimedia Studio gives you the most advanced web authoring and playback capabilities available. Create Internet and hybrid CD+Internet applications with new drag-and-drop behaviors and live web authoring. With streaming Shockwave, there's no waiting for the entire file to download—even over small bandwidth connections!

Upgrade ..... **$479.57** CDW 84234
Full version ..... **$937.20** CDW 84233

Hardware, Software & Peripherals at *DISCOUNT* Prices!

NETWORKING PRODUCTS

Microsoft

Windows NT Server V4.0
Upg + 5-client license CD 365 77
Upg + 10-client license CD 485 83
Comp upg + 5-client license CD 365 77
Comp upg + 10-client license CD 485 83
[illegible] + 5-client license CD 729 14
Server + 10-client license CD 1006 40
Single-client license upg 15 52
Single-client license 29 96

Windows NT Workstation V4.0
Version upg CD 129 52
Single-client upg 229 98
Full version CD 269 94

Novell

IntranetWare
5-user CD 739 47
10-user CD 1324 67
25-user CD 2328 46
50-user CD 3305 47
Call for Novell IntranetWare upgrades.
IntranetWare for Small Business
1-user additional license 45 07
5-user additional license 218 23
Server with 5 licenses 598 63
Call for additional Novell IntranetWare multi-user configurations.

3Com

Impact IQ ISDN modem external 249 86
[illegible]-TPO EtherLink III 10BT ISA 58 58
3C509B-COMBO EtherLink III combo ISA 119 36
3C509B-TPC EtherLink III coax ISA 99 45
3C905-TX Fast EtherLink XL 10/100 PCI 84 31
3C900-TPO EtherLink XL 10BT PCI 97 41
[illegible] XL PCI [illegible] 117 55
OfficeConnect 4-port hub 68 46
OfficeConnect 8-port hub 109 90
SuperStack II Hub 7568112-port 10BT 499 49
SuperStack II Hub 24-port 10BT 868 58

Allied Telesyn International

AT-2000T Plus 16-bit ISA bus adapter card 21 22
AT-[illegible] simple-mem transceiver 23 84

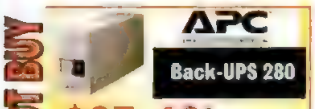
CHEYENNE

ARCserve V6.1 for NetWare workgroup edition [illegible] license 376 98
ARCserve V6.1 for NetWare enterprise edition unlimited-user license 1068 39

Linksys

FastHub 104T 4-port 100BTX hub 487 68
FastHub 108T 8-port 100BTX hub 758 64
FastHub 216T 100BTX Fast Ethernet hub 1839 45

HOT BUY



$87.42* CDW 44559

HEWLETT PACKARD

HP JetDirect 150X print server 187 98
HP JetDirect 10/100BT print server card internal 389 92
HP JetDirect Ethernet 10BT 307 04
HP JetDirect EXPlus print server external 269 40
HP JetDirect EXPlus3 print server external 389 78

IBM PC Server 310
5/200 32MB no hdd 8X CD 2088 89
5/200 32MB 2 1GB 8X CD 2465 91
IBM PC Server 315
6/200 32MB no hdd 8X CD 2399 63
6/200 32MB 2 1GB 8X CD 2799 96
IBM PC Server 330
6/200 32MB ECC optional hdd 8X CD 3739 20
6/200 32MB ECC optional hdd 8X CD 4247 09
6/200 32MB ECC 2x2 25GB 8X CD 7868 68

DATA STORAGE

Iomega

Zip drive 100MB parallel 149 95
Zip drive 100MB external SCSI 149 95
Zip drive 100MB internal SCSI 149 95
Ditto Easy 800MB Travan internal 99 95
Jaz drive 1GB internal SCSI-2 299 95
Jaz drive 1GB external SCSI-2 399 95
Ditto drive 2GB internal 149 95
Ditto drive 2GB external 199 95
Ditto Master Card 59 95

HEWLETT PACKARD

HP [illegible] TAPE 8 2GB TRU 186 98
HP Colorado T4000e Travan internal 368 75
HP Colorado T4000s Travan external 449 46

HOT BUY

$172.89* CDW 72264

Quantum

Fireball ST 1.6GB Ultra ATA 178 21
Fireball ST 2.1GB Ultra ATA 184 73
Fireball ST 3.2GB Ultra ATA 235 52
Fireball ST 4.3GB Ultra ATA 280 55
Fireball ST 6.4GB Ultra ATA 368 64

Seagate

1.2GB Fast ATA-2 174 44
2.1GB Fast ATA-2 179 29
2.1GB Ultra SCSI 509 37
2.5GB Fast ATA-2 209 16
4.5GB Ultra SCSI 844 95
9.1GB Ultra SCSI 1108 67

WESTERN DIGITAL

Caviar 1.2GB EIDE 175 32
Caviar 1.6GB EIDE 169 00
Caviar 2GB EIDE 207 12
Caviar 2.16GB EIDE 228 46
Caviar 3.1GB EIDE 228 50
Caviar 4GB EIDE 314 92

INPUT DEVICES

Connectix Color QuickCam V2.0 218 82
Epson PhotoPC digital camera 345 99
Epson PhotoPC 500 digital camera 499 00
Epson ActionScanning System II 199 34
Epson Expression 636 Exec scanner 799 00
Hewlett Packard ScanJet 5p 199 58
Hewlett Packard ScanJet 5p 266 86
Hewlett Packard ScanJet 6xse 699 77
Kensington Mouse-in-a Box 27 29
Kensington Expert Mouse V5.0 PS/2 95 83
Kensington Orbit 51 56
Kodak DC50 Zoom Digital Camera 699 00
Kodak DC120 Zoom Digital Camera 999 00
Logitech Cyberman II game controller 89 29
Logitech PageScan Color Pro 249 27
Microtek Color PageWiz compact scanner 158 21
Microtek ScanMaker E3 color flatbed 172 89
Microtek ScanMaker E6 48-color flatbed 259 72
Microtek ScanMaker V310 color flatbed 139 41
UMAX Astra 610P scanner 209 52
UMAX Astra 1220S scanner 218 51
UMAX Astra 1236S scanner w/Photo Deluxe 449 08
Visioneer PaperPort mx scanner 163 89
Visioneer PaperPort ix scanner 189 37
Visioneer PaperPort Strobe scanner 299 00

MONITORS

MAG Innovision 410V2 14" 0.28mm 209 50
MAG Innovision 510V2 15" 0.28mm 289 44
MAG Innovision 710V2 17" 0.28mm 459 70
Magnavox MB4010 14" 0.28mm 219 66
Magnavox MV5011 15" 0.28mm 275 94
Magnavox MB7000 17" 0.28mm 509 18
NEC MultiSync E500 15" 0.25mm 374 91
NEC MultiSync E700 17" 0.25mm 659 18
NEC P750 17" 0.25mm 849 20
NEC P1150 21" 0.28mm 1498 63
Princeton E050 15" 0.28mm 267 44
Princeton E070 17" 0.28mm 469 36
Princeton E080 19" 0.26mm 849 20

MONITORS

Samsung SyncMaster 500s 15" 0.28mm 289 00
Samsung SyncMaster 700s 17" 0.28mm 519 00
Sony Multiscan 100sx 15" PnP 0.25mm 329 00
Sony Multiscan 100sf 15" PnP 0.25mm 389 54
Sony Multiscan 200sf 17" PnP 0.25mm 709 67
Sony Multiscan 300sf 20" PnP 0.30mm 1398 75
ViewSonic E641 14" 0.28mm 209 66
ViewSonic E655 15" 0.28mm 289 59
ViewSonic G771 17" 0.27mm 556 28
ViewSonic P815 21" 0.25mm 1549 27

PROCESSOR UPGRADES

intel

Pentium OverDrive Processors
83MHz 198 47
120/133MHz upg for 5/60, 5/66 197 55
Pentium OverDrive Processors w/MMX Technology
125MHz upg for 75MHz 194 88
150MHz upg for 90MHz 194 88
166MHz upg for 100MHz 197 55

PC CARDS

3Com LAN PC Card combo 174 13
3Com 33.6 10BT LAN+modem 299 30
3Com 33.6 10BT LAN+[illegible] 338 38
3Com 32-bit Fast EtherLink XL CardBus 147 57
Hayes ACCURA 33.6 10BT Ethernet 299 91
Hayes ACCURA 56K 196 87
Hayes OPTIMA 56K 199 14
Intel EtherExpress PRO/100 16-bit PC Card adapter 158 61
Intel EtherExpress PRO/100 32-bit Card Bus adapter 179 79
[illegible] 179 16
[illegible] 359 16
New Media PC Card joystick adapter 58 06
Practical Peripherals 33.6 149 46
Practical Peripherals 56K Flex cellular 179 91
Simple 33.6 cellular 132 99
Simple 33.6 Communicator w/SimpleJack 145 42
Simple 56K Communicator 157 06
U.S. Robotics Ethernet adapter w/XJACK 108 00
U.S. Robotics 33.6 cellular 229 95
U.S. Robotics 33.6 cellular w/XJACK 229 95
U.S. Robotics 33.6 w/XJACK 219 00
U.S. Robotics 56K w/XJACK 229 20
Xircom 33.6 179 79
Xircom 33.6 Ethernet 10BT 278 13
Xircom 33.6 Ethernet combo 309 35

HOT BUY

$71.62* CDW 58[illegible]

MODEMS

TelePort 56K x2 faxmodem internal 149 44
TelePort 56K x2 faxmodem external 159 77

Hayes

ACCURA 33.6 faxmodem internal 95 61
ACCURA 33.6 faxmodem external 119 41
OPTIMA 336 Business Modem internal 169 02
OPTIMA 336 Business Modem external 179 91
ACCURA 56K internal 139 29
ACCURA 56K external 189 71
ACCURA 56K speakerphone internal 177 98
ACCURA 56K speakerphone external 185 07
OPTIMA 56K internal 267 21
OPTIMA 56K external 289 59
ACCURA ISDN 249 45

MOTOROLA

[illegible] 56K internal 145 22
[illegible] 56K external 159 92
[illegible] 56K internal 158 82
[illegible] 56K external 179 11
BitSURFR Pro EZ ISDN 259 86

MODEMS

Supra

56K data/fax modem internal 129 97
56K data/fax modem external 164 78

U.S. Robotics

Sportster Series
Winmodem V.34 33.6 internal w/fax 76 24
V.34 33.6 internal w/fax 114 38
V.34 33.6 external w/fax 139 38
Voice V.34 33.6 internal w/fax 139 07
Voice V.34 33.6 external w/fax 159 80
56K x2 internal 197 99
56K x2 external 217 99
56K x2 Voice internal 217 99
56K x2 Voice external 237 99
ISDN 128K terminal adapter 226 93
Courier Series
V.34 33.6 internal w/fax 215 81
V.34 33.6 external w/fax 236 73
56K x2 internal 229 55
56K x2 external 264 99
[illegible] ISDN V.34 faxmodem internal 239 02
[illegible] ISDN V.34 faxmodem external 279 63
DataBurst ISDN U interface external 206 25
DataBurst ISDN S/T interface external 239 39

HOT BUY

$59.93* CDW 91101

ZOOM

X3.[illegible] internal 109 91
V.34I Plus 33.6 faxmodem internal 79 80
X.34I Plus 33.6 faxmodem external 99 22
56K internal 139 29
56K external 159 86

PRINTERS

Canon

BJ-30 monochrome 269 80
BJC-70 299 41
BJC 240 169 00
BJC-620 299 00
BJC-4200 199 00
BJC-4650 499 00

EPSON

FX870 289 18
LQ670 349 85
LQ2070 384 00
LX300 169 17
Stylus Color 400 199 00
Stylus Color 600 299 00
Stylus Color 800 399 00
Stylus Color 1520 799 00
Stylus Color 3000 1999 00
Stylus Photo 499 00

HEWLETT PACKARD

HP DeskJet 340 portable inkjet printer 279 28
HP DeskJet 540C color printer 199 00
HP DeskJet 694C color printer 299 00
HP DeskJet 820Cse color printer 449 00
HP DeskJet 1000Cse color printer 499 00
HP LaserJet 5 printer 1044 82
HP LaserJet 5Lse printer 399 00
HP LaserJet 6MP printer 859 55
HP LaserJet 6Pse printer 799 00
HP OfficeJet 570 multi-function 599 00

LEXMARK

Color Jetprinter 1020 149 98
Color Jetprinter 2000 185 24
Color Jetprinter 3000 199 54
Color Jetprinter 3000 239 50
Color Jetprinter 7000 404 45
Optra E+ 364 96
Optra S 1250 1099 41
Optra S 1650 1259 32
Optra E [illegible] 2189 10
Optra SC 1275 3018 00

* Special pricing valid through 10/15/97 or while supplies last.

800-326-4239

www.cdw.com/pcy

CDW has more than 350 account managers to help you with your computing needs

©1997 CDW Computer Centers, Inc.
200 N. Milwaukee Avenue, Vernon Hills, IL 60061 PCM0596 10/97

a rare sales tool.
it's called objectivity.

SYMANTEC

pcANYWHERE 32 V8.0
For Windows 95 and NT

Symantec pcANYWHERE32 V8.0 gives you optimal 32-bit support for both Windows 95 and Windows NT. It also includes versions of pcANYWHERE for Windows V3.1 and DOS so you can run pcANYWHERE on all the platforms you use. pcANYWHERE supports the latest, fastest hardware to optimize your connection time.

Host and remote *$70 rebate!*	$65.67*	CDW 93317
Host only	$78.75	CDW 93320
Remote only	$89.78	CDW 93322

**After $70 mail-in manufacturer rebate. Restrictions apply–please call for details.*

Office 97 Professional Edition

Microsoft

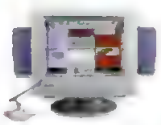
Office 97 Professional Edition upgrade with Bookshelf Basics	$268.30*	CDW 78404
Office 97 Professional Edition with Bookshelf Basics	$529.80	CDW 78403
Office 97 Professional Edition upgrade with Bookshelf Basics and IntelliMouse	$294.51*	CDW 78405
Standard Edition upgrade	$179.13*	CDW 78407
Standard Edition	$445.21	CDW 78406
Small Business Edition competitive upgrade	$184.29*	CDW 82848
Small Business Edition	$449.52	CDW 82847

**After $40 mail-in manufacturer upgrade rebate. Restrictions apply. Offer valid while supplies last.*

SAMSUNG ELECTRONICS

SyncMaster 700s
17" color monitor

- 17" diagonal flat square tube, 15.7" viewable image size
- 0.28mm dot pitch
- Maximum resolution: 1280 x 1024 at 60Hz
- Invar shadow mask
- 3-year warranty with advance replacement



Shown with optional multimedia/Internet upgrade kit

$519.00 CDW 85571

700b ..... $579.31 CDW 85573

CDW® carries more than 20,000 products! If you don't see it, Call!

COMPUTERS

TOSHIBA

Libretto mini-notebooks
50CT 575 16MB 772MB 8.1" active ... 1929.48

Satellite & Satellite Pro notebooks
220CDS 5/133 16MB 1.34GB 12.1 dual 10X CD ... 1899.13
440CDX 5/133 MMX 16MB 1.34GB 12.1" dual 10X CD ... 2359.54
440CDT 5/133 MMX 16MB 1.34GB 12.1" active 10X CD ... 2798.86
460CDT 5/166 MMX 32MB 2.02GB 12.1" active 10X CD ... 3068.16

Portege notebooks
300CT 5/133 MMX 32MB 1.5GB 10.4" active ... 3368.48
660CDT 5/150 16MB 1.2GB 11.3" active 10X CD ... 3898.63
900CDT 5/120 16MB 1.26GB 12.1" active 8X CD ... 1995.94

Tecra notebooks
510CDT 5/133 16MB 2.1GB 12.1" active 10X CD ... 2699.76
520CDT 5/166 MMX 32MB 2GB 12.1" active 10X CD ... 4139.45
530CDT 5/166 MMX 32MB 2GB 12.1" active 10X CD ... 4579.17
730XCDT 5/150 MMX 16MB 2GB 12.1" active 10X CD ... 3498.77
740CDT 5/166 MMX 16MB 3GB 13.3" active 10X CD ... 4658.23
740CDT 5/166 MMX 16MB 3GB 13.3" active 10X CD ... 4848.82

Infinia mini-towers
7151 5/166 MMX 16MB 1.35GB 12X CD ... 1649.89
7201 5/200 MMX 32MB 2GB 12X CD ... 1999.24

Equium desktops
3150D 5/166 MMX 32MB 2.1GB 12X CD ... 1418.82
5200D 5/200 MMX 32MB 2.1GB 12X CD ... 1549.94
8200D 6/200 32MB 3GB 12X CD ... 2118.60

Equium mini-towers
5200M 6/200 32MB 4.3GB 12X CD ... 2479.47
6280M 266MHz Pentium II 32MB 3.7GB 16X CD ... 2569.07

ACER / TEXAS INSTRUMENTS

Extensa notebooks
610CD 5/150 16MB 1.4GB 11.3" dual 10X CD ... 1964.67
610CDT 5/150 16MB 1.4GB 11.3" active 10X CD ... 2548.84
660CD 5/166 MMX 16MB 1.35GB 12.1" dual 10X CD ... 2699.58
660CDT 5/166 MMX 16MB 2.1GB 11.3" active 10X CD ... 3179.04

TravelMate notebooks
TM7080 5/166 MMX 32MB 2GB 12.1" active 10X CD ... 4298.58
TM7063NT 5/166 MMX 32MB 3GB 12.1" active 10X CD ... 4648.60

AST

Ascentia notebooks
A60- 5/150 16MB 1.44GB 12.1" active 10X CD ... 2647.33
A70- 5/150 MMX 16MB 1.44GB 12.1" active 10X CD ... 3078.78
P70 5/150 MMX 32MB 2.1GB 12.1" active 10X CD ... 3399.54
P80 5/166 MMX 32MB 3GB 12.1" active 10X CD ... 3868.45

Bravo LC 6233 Series desktops
233MHz Pentium II 32MB 2GB WinNT ... 2099.23
233MHz Pentium II 32MB 2GB WinNT ... 2197.23

Bravo MS Series desktops
5/166 16MB 2GB ... 1245.78
5/166 32MB 2GB 16X CD ... 1487.26
5/166 32MB 3GB 16X CD ... 1585.21
5/166 MMX 32MB 2GB 16X CD ... 1514.69
5/166 MMX 32MB 2GB 16X CD ... 1619.87
5/200 32MB 3GB 16X ... 1549.10
5/200 32MB 3GB 16X CD ... 1487.26
5/200 MMX 32MB 3GB 16X CD ... 1696.69
5/200 MMX 32MB 3GB 16X CD ... 1799.25

COMPUTERS

AST

Bravo MS-T Series mini-towers
5/166 32MB 3GB 16X CD ... 1699.72
5/200 32MB 3GB 16X CD ... 1544.09
5/200 32MB 3GB 16X CD ... 1649.08
5/200 MMX 32MB 3GB 16X CD ... 1779.77
5/200 MMX 32MB 3GB 16X CD ... 1879.96
6/200 32MB 2.5GB 8X CD ... 1866.33

COMPAQ

Armada notebooks
1520DM 5/133 16MB 1GB 11.3 dual 10X CD ... 1998.47
1530DM 5/133 MMX 16MB 1.4GB 12.1" dual 10X CD ... 2499.00
1560DMT 5/133 16MB 1.4GB 12.1" active 10X CD ... 2999.00
1580DMT 5/150 MMX 16MB 2.1GB 12.1" active 10X CD ... 3499.00
4130T 5/133 16MB 1.08GB 11.8" active ... 2497.23
4131T 5/133 16MB 1.4GB 12.1" active ... 2849.00
7710MT 5/150 MMX 16MB 1.6GB 12.1" active ... 4399.00
7730MT 5/166 MMX 32MB 2.1GB 12.1" active ... 4999.00
7750MT 5/166 MMX 32MB 2.1GB 12.1" active ... 5799.00

Deskpro 3000 desktops
5133/1200 5/133 16MB 1.2GB ... 879.00
5133/2500 5/133 16MB 2.5GB ... 1099.00
5166X/2100 5/166 MMX 16MB 2.1GB ... 1199.00
5166X/3200 5/166 MMX 16MB 3.2GB ... 1309.00
5200X/2100 5/200 MMX 16MB 2.1GB ... 1389.00
5200X/3200 5/200 MMX 32MB 3.2GB ... 1579.00
5233X/3200/CDS 5/233 MMX 32MB 3.2GB 16X CD ... 1949.00

Deskpro 2000 mini-towers
5166X/3200 5/166 MMX 16MB 3.2GB 16X CD ... 1619.00
5200X/3200/CDS 5/200 MMX 32MB 3.2GB 16X CD ... 1799.00
6200/2500/CD 6/200 32MB 2.5GB 8X CD ... 2109.00

Deskpro 4000 desktops
5166X/2400 5/166 MMX 16MB 2.4GB ... 1389.00
5166X/3200 5/166 MMX 32MB 3.2GB ... 1599.00
6233X/2500/CDS 233MHz Pentium II 32MB 2.5GB 8X CD ... 2319.00
5200X/2400 5/200 MMX 16MB 2.4GB ... 1689.00
5200X/3200 5/200 MMX 32MB 3.2GB ... 1789.00

Deskpro 4000 mini-towers
5166X/3200/CDS 5/166 MMX 32MB 3.2GB 16X CD ... 1799.00

Deskpro 6000 desktops
6200/4200/CDS 6/200 32MB 4.2GB ... 2799.00
6233X/2150/PDS 233MHz Pentium II 32MB 2.15GB ... 2629.00
6266X/4200/CDS 266MHz Pentium II 32MB 4.2GB 8X CD ... 3179.00

Deskpro 6000 mini-towers
6200/4200/PDS 6/200 64MB 4.3GB ... 3899.00

Presario desktops
2120 5/150 24MB 2GB 8X CD ... 999.00
2200 5/180 16MB 1.6GB 8X CD ... 799.00

Presario mini-towers
4504 5/200166MB 2.1GB 16X CD ... 999.00
4814 5/233 MMX 32MB 6.5GB 24X CD ... 1999.00
4824 5/233 MMX 32MB 6.5GB 24X CD ...
Iomega Zip drive ... 2399.00

HEWLETT PACKARD

HP OmniBook 800 Series notebooks
800CT 5.166 MMX 16MB 2GB 10.4" active ... 3679.00

HP OmniBook 5700 Series notebooks
5/150 MMX 16MB 1.66GB 12.1" active ... 3867.00
5/166 MMX 16MB 1.66GB 12.1" active ... 4039.00
5/166 MMX 16MB 1.66GB 12.1" active ... 4096.82
5/166 MMX 32MB 2.79GB 12.1" active ... 4574.01

COMPUTERS

HEWLETT PACKARD

HP Vectra VL Series 5 PC desktops
5/166 16MB 1.6GB ... 1186.38
5/166 MMX 16MB 2.5GB 8X CD ... 1377.06
5/200 MMX 32MB 2.5GB 8X CD ... 1586.63
5/233 MMX 16MB 2.5GB ... 1598.12

HP Vectra VL Series 5 PC mini-towers
5/133 16MB 1.6GB ... 1219.44
5/166 16MB 2.5GB ... 1229.50
5/166 MMX 16MB 2.5GB 8X CD ... 1439.22
5/233 MMX 32MB 4GB ... 1869.76

HP Vectra VE Series 3 PC desktops
5/133 16MB 1GB ... 1034.62
5/133 16MB 1.6GB ... 999.36
5/166 16MB 1.6GB ... 1038.97
5/166 16MB 1.6GB ... 1048.80

HP Vectra 500Series desktops
525CD 5/133 16MB 1.2GB 8X CD ... 999.49
520MCx 5/166 16MB 1.6GB 16X CD ... 1327.84

HP Vectra 600 Series mini-towers
525CD 5/166 16MB 1.6GB 16X CD ... 1234.78
525MCx 5/166 MMX 24MB 2.5GB 16X CD ... 1549.65
525CD 5/200 MMX 24MB 2.5GB 16X CD ... 1586.65
525MCx 5/200 MMX 32MB 2.5GB 16X CD ... 1636.70

HP NetServer E40 Series towers
6/180 16MB no hdd 8X CD 10/100 Ethernet ... 2067.51
6/180 16MB 2.1GB 8X CD 10/100 Ethernet ... 2287.49
6/200 32MB 2.1GB 8X CD 10/100 Ethernet ... 2649.30

IBM

ThinkPad notebooks
360 5/150 16MB 1.08GB 12.1" dual ... 1699.46
360D 5/150 16MB 1.35GB 12.1" dual 8X CD ... 1999.50
360D 5/150 MMX 16MB 2.1GB 12.1" active 8X CD ... 3297.63
560 5/133 8MB 2.1GB 11.3" dual ... 1899.58
560 5/133 8MB 2.1GB 12.1" active ... 3799.45
560E 5/150 MMX 16MB 2.1GB 11.3" dual ... 2599.88
560E 5/166 MMX 16MB 2.1GB 12.1" active ... 4186.26
760ED 5/133 16MB 2.1GB 12.1" active 8X CD ... 3739.72
760E 5/150 16MB 2.1GB 12.1" active ... 3878.40
760XL 5/166 MMX 16MB 2.1GB 12.1" active ... 3769.88
760XL 5/166 MMX 32MB 2.1GB 12.1" active ... 4064.04
760XD 5/166 MMX 32MB 3GB 12.1" active 8X CD ... 4478.37
765L 5/166 MMX 32MB 3GB 13.3" active ... 3869.71
765D 5/166 MMX 32MB 3GB 13.3" active 8X CD ... 4059.53

Aptiva Series mini-towers
C3E 5/233 MMX 32MB 4.2GB 16X CD ... 1939.05
C3D 5/233 MMX 32MB 4.2GB 8X CD ... 2099.00
S3E 5/233 MMX 32MB 4.2GB 16X CD ... 1939.05
S3C 5/233 MMX 32MB 4.2GB 16X CD ... 2299.00
S35 5/233 MMX 48MB 6.4GB 24X CD ... 2899.00

PC300GL Series desktops
5/166 16MB 1.2GB ... 999.63
5/166 16MB 2.5GB ... 1109.18
5/166 16MB 2.5GB 16X CD ... 1368.50
5/166 MMX 32MB 2.5GB ... 1418.38

PC300XL Series desktops
233MHz Pentium II 32MB 2.5GB 16X CD ... 2296.14
233MHz Pentium II 32MB 2.5GB ... 1999.36
266MHz Pentium II 32MB 4.2GB 16X CD ... 2659.12
266MHz Pentium II 32MB 4.3GB 16X CD ... 2999.24

COMPUTERS

FUJITSU

LifeBook 500 Series notebooks
565Tx 5/150 MMX 16MB 2GB 12.1" active 10X CD ... 3499.00
565Tx 5/166 MMX 32MB 2GB 12.1" active 20X CD ... 4299.00

LifeBook 600 Series notebooks
635T 5/133 16MB 1.3GB 12.1" active ... 2799.00
655Tx 5/150 MMX 16MB 1.3GB 12.1" active ... 3799.00

HITACHI

VisionBook Plus Series notebooks
4140 5/133 16MB 1.4GB 12.1" dual 10X CD ... 1799.00
4150x 5/150 MMX 16MB 1.4GB 12.1" dual 10X CD ... 2499.00
4360x 5/166 MMX 16MB 1.4GB 12.1" active 10X CD ... 3499.00

VisionBook Pro Series notebooks
7340 5/133 MMX 16MB 1.4GB 12.1" active 10X ... 2199.00
7360 5/150 MMX 16MB 2.1GB 12.1" active 10X CD ... 4499.00
7580 5/166 MMX 16MB 3GB 13.3" active 10X CD ... 4999.00

VisionBook Elite Series notebooks
8580 5/166 MMX 16MB 2.1GB 13.3" active 10X CD ... 4799.00

SAMSUNG

Sens Pro Series notebooks
521 5/133 16MB 1.44GB 12.1" active 10X CD ... 2349.37
523 5/133 32MB 2.1GB 12.1" active 10X CD ... 2834.89
525 5/150 MMX 48MB 2.1GB 12.1" active 10X CD ... 3966.71

HANDHELD PCs

Casio Cassiopeia A-11 4MB ... 484.13
Hewlett-Packard 300LX Palmtop PC 4MB ... 477.34
Hewlett-Packard 320LX Palmtop PC 4MB ... CALL!
Philips Velo 1 4MB ... 730.99
U.S. Robotics PalmPilot Personal ... 288.99
U.S. Robotics PalmPilot Professional ... 377.99

CDW® DIRECTORY

PC sales	800-326-4239
Mac sales	800-524-4239
Corporate sales	800-280-4239
Corporate software sales	800-294-4239
Government and Education sales	800-808-4239

CDW® TELEPHONE HOURS

Sales
Monday-Friday 7 a.m.-9 p.m. CT
Saturday 9 a.m.-5 p.m. CT

Tech Support for Customers
Monday-Friday 8 a.m.-9 p.m. CT
Saturday 9 a.m.-5 p.m. CT

BUY WITH CONFIDENCE
CDW® IS A NASDAQ TRADED COMPANY
TICKER SYMBOL: CDWC D & B rated 5A1 Dunn 10-782-7062

VISA MasterCard

Credit card charges are not submitted until time of shipment. For your protection, we ship only to your credit card's verified billing address. Freight is calculated as the carrier's actual freight charge plus insurance and packaging material. The cost of insurance is 0.35% (0.0035) of the order total. Packaging materials will not exceed $4.00 for single package shipments or $6.00 for multi-package shipments. Before returning any product, you must obtain an RMA number. Non-defective returns are subject to a restocking fee. Software, chips and other electronic components are not returnable. Allow 10 business days for shipping when paying by personal check. All pricing subject to change. For all prices, products and offers, CDW reserves the right to make adjustments due to changing market conditions, product discontinuation, manufacturer price changes, errors in advertisements or other extenuating circumstances. All trademarks and registered trademarks are the sole property of their respective owners.

COMPUTER DISCOUNT WAREHOUSE

All CDW® account managers are graduates of CDW University, the industry's best training program.

800-326-4239

www.cdw.com/go

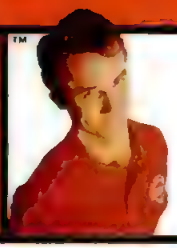
©1997 CDW Computer Centers, Inc.

CIRCLE 188 ON READER SERVICE CARD OR GO TO WWW.HOMEMAG.COM/ProductCircle

PRINTED IN U.S.A. 208 N. Milwaukee Avenue, Vernon Hills, IL 60061

CDW COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.



"Great prices, superior service"

Microsoft

CDW® is your "BEST PLACE TO BUY" Software!

CDW® is the #1 mail-order reseller of Microsoft products!

Office 97 Professional Edition upgrade

With Bookshelf Basics and IntelliMouse

$40 rebate!

For Windows 95 and NT Workstation

■ Office 97 Professional Edition contains five powerful applications: Microsoft® Excel 97, Microsoft Word 97, Microsoft PowerPoint® 97, Microsoft Access 97 and the newest addition to Office, the Microsoft Outlook™ 97 desktop information manager, which helps you manage your time, communications, and documents ■ The Bookshelf Basics multimedia reference library gives you fast access to a world of information ■ CD-ROM contains thousands of clip art images, plus .avi files and more ■ Microsoft IntelliMouse, with its innovative wheel, puts the power to zoom and scroll at your fingertips so you get more done with less effort ■ Built-in, integrated tools let you easily create and publish content for the web ■ The innovative Office Assistant gives you interactive help—providing advice and tips as you work

Hurry! Limited time offer!

$294.51* CDW 78405

Professional Edition upgrade with Bookshelf Basics
$268.30* CDW 78404

Professional Edition with Bookshelf Basics
$529.80 CDW 78403

Standard Edition upgrade
$179.13* CDW 78407

Standard Edition
$445.21 CDW 78406

Small Business Edition competitive upgrade
$184.29 CDW 82848

Small Business Edition
$449.52 CDW 82847

More than 10 MILLION copies of OFFICE 97 applications sold!

*After $40 mail-in manufacturer upgrade rebate for upgrades from one of the following programs for Windows 95 or earlier. Microsoft Office, Professional or Standard edition; Word; Excel; PowerPoint; Access or Works, users upgrading from competitive products do not qualify for the rebate offer. Offer valid while supplies last.

Seagate Software

CDW is your "BEST PLACE TO BUY" Networking!

new!

Seagate Backup Exec for Windows NT V7.0

The complete Windows NT backup solution

Seagate Backup Exec™ for Windows NT is the system of choice for high-performance, reliable Windows NT data protection–and the most comprehensive solution for 100% BackOffice compatibility. As the first backup solution designed for Windows NT, Backup Exec incorporates the Windows NT APIs for superior 32-bit performance and ease-of-use.

And, Seagate Backup Exec's Intelligent Disaster Recovery™ option provides the only diskette-based "point-in-time" recovery option that eliminates the need to reload the operating system first. This powerful feature gets you back online fast by allowing you to restore from your last backup set–including differential and incremental backups. In the event of a system or hardware failure, only Backup Exec combines the performance, reliability and flexibility to maximize data recovery you can depend on.

Now in its fifth generation, Seagate Backup Exec puts you in complete control with 24-hour network-wide scheduling, administration, monitoring, device and media management. As the developer of the Microsoft Exchange Server and Windows NT backup utility, Backup Exec is the ideal solution for all of your data protection needs.

■ The number one Windows industry standard Windows NT backup solution used by Microsoft providing total data protection ■ Using optional Seagate Intelligent Disaster Recovery, Seagate provides the fastest restoration of valuable data without re-installing the Windows NT operating system ■ Adding Seagate Agent Accelerator provides unmatched performance when backing up remote Windows NT machines and servers ■ Backup operations become easier with Backup Assistant and wizard selections ■ Detailed reporting is made easy through built-in Crystal Reporting capabilities

Enterprise edition ..... **$858.91** CDW 94890

Single-server edition ..... **$429.88** CDW 94889

Exchange agent ..... **$429.88** CDW 94893

NetWare agent ..... **$429.88** CDW 94895

SQL Server agent ..... **$429.88** CDW 94892

Autoloader Module ..... **$367.98** CDW 94891

Visit CDW on the Internet for secure online ordering!

800-326-4239

www.cdw.com/pcm

CDW Computer Centers, Inc.

CIRCLE 318 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

PCM3242Q 10/7/97

200 N. Milwaukee Avenue, Vernon Hills, IL 60061

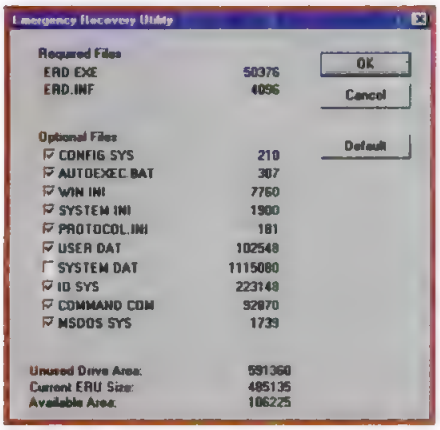


FIGURE 2: *The Emergency Recovery Utility will save these files to a bootable floppy disk; restoring them is as simple as booting from the floppy disk.*

and double-click on Eru.exe. Now just follow the directions. In case of disaster, reboot your system with the floppy; the disk will automatically restore some of your Windows 95 settings.

ELIAS RIVERA
North Brunswick, New Jersey

PC MAGAZINE: The Emergency Recovery Utility (ERU) copies essential system files to a bootable floppy disk or hard disk directory, along with the recovery program ERD.EXE (see Figure 2). Note that by default ERU does not copy System.dat, because it can be very large. You can make a separate copy of System.dat, for added protection.

You should run ERU to update your emergency recovery disk any time you make significant changes to your system. You may even choose to maintain two or three such disks. That way if your most recent changes cause problems, you can replace the files with their previous versions.

Since you'll be using ERU.EXE again and again, you should copy the contents of D:\other\misc\eru on the Win 95 CD-ROM to a handy location on your hard disk. If disaster strikes, simply restart the computer with the emergency disk in drive A:. ERD.EXE will run automatically and restore the saved files.

Sometimes restoring the files saved by ERU isn't enough to get your system working again. It's smart to copy other useful command line utilities to a floppy disk, so you can use them even if the hard disk is inaccessible.

Almost all of the available space on the bootable emergency disk is occupied by the saved files, but a little space is probably left for SYS.COM, which needs to reside on a bootable disk. Switch to the Command folder in your system's Windows folder and copy SYS.COM to the emergency disk. Now if your hard disk won't boot because its boot sector is damaged, you may be able to restore it by booting from the emergency disk and issuing the command SYS C:. Format another floppy disk without copying the system files; then copy all of the files from the Command folder to it, just in case you need them. A 1.44MB disk should have room for all of the files in that folder.

A Windows 95 OSR2 Warning

Readers should be cautious about the suggestion in the March 25, 1997, User-to-User as to adding dual-boot capability to a Windows 95 machine: If you have Windows 95 OSR2, you will end up with a system that will not boot. When OSR2 was in beta testing, it could be installed as an upgrade and could dual-boot with a previous operating system; Microsoft removed these features for the final release. (No future release of Windows 95 will support dual-booting with earlier DOS versions.) The technique described in the March 25 column lets you boot to the previous OS but hangs when you try to boot to OSR2 again. This information is from the excellent FAQ at www.users.cts.com/king/s/serwin/osr2.html.

You can still use a third-party boot manager for dual-booting (such as the one bundled with PartitionMagic 3.0 for OS/2 or Windows NT 4.0).

> You should run ERU to update your emergency recovery disk any time you make significant changes to your system.

As an experiment, I tried following the steps given in User-to-User on a new PC that came with Win 95 OSR2 preinstalled. I ended up having to boot an emergency repair disk and use SYS C: to restore the boot sector before the PC would again boot.

Numerous hazards of this sort are involved with the use of OSR2, and I am surprised how little mention of this appears in the computer publications. Most users I've spoken to don't even realize that a different Win 95 version is on their new machines and that the changes can have a critical effect on operation, particularly for running older applications.

GREGORY SHERAR
Minneapolis, Minnesota

PC MAGAZINE: If you're not sure whether your new computer has Windows 95's OSR2 (OEM Service Release 2), right-click the My Computer icon and select Properties. On the General page of the resulting System Properties dialog, you'll see a long version number below the words *Microsoft Windows 95*. The original release has the version number 4.00.950, and OSR2 has 4.00.950B. This version is available only preinstalled on a new computer; it is not sold as an upgrade for existing systems. And as this reader notes, it does not support dual-booting to a previous DOS version. Unfortunately, this fact wasn't known when the User-to-User article mentioned above was written.

When you attempt to enable dual-boot under OSR2 using techniques recommended for the original version of Windows 95, you will be able to switch to your old DOS, but you won't be able to switch back! The computer may hang, or you may get an error message about an unsupported DOS version. To solve this problem, boot from a disk and use the command SYS C: to restore the system files on drive C:.

If you don't have an emergency boot disk, or if you have only a disk created for the original version of Windows 95, now is the time to create one. Open a DOS box, put a blank disk in your A: drive, and issue the command

```
FORMAT A: /U /S /V:BootDisk
```

The /S switch causes FORMAT to copy the bare minimum of system files to the boot disk. With this disk you can boot into DOS 7.1 (the version associated with OSR2). But it's wise also to copy SYS to the emergency disk, along with other low-level utilities such as FORMAT, FDISK, ATTRIB, EDIT, MOVE, XCOPY, and SCANDISK. These files are found in the Command folder under the folder that contains Windows 95 itself.

The inability to dual-boot to old DOS is a small change in OSR2; the big change is FAT32 support. FAT32 is a 32-bit file system that avoids the wasted disk space inherent in FAT, the file system used by DOS and the original Windows 95. FAT cannot support hard disks larger than 2GB; FAT32 handles huge disks with ease. The catch? No other operating system can access a disk that uses FAT32. Not DOS, not Windows NT, not even the previous version of Windows 95.

For a system that uses OSR2, we advise caution in applying tips and techniques developed for the original version of Windows 95. The full extent of OSR2's differences hasn't been mapped, and there may be other pitfalls like the dual-boot problem.

REPLACE YOUR HARD DRIVE, NOT YOUR NOTEBOOK.

INFINITY FEATURES

High Capacity
Available in sizes ranging from 1.44 to 3.08 GB

Removable
Plug and Play design.

Easy Installation
Includes EZ-Drive software from Micro House for easy, one-step installation.

Performance
Fast 16.6 megabytes per second average transfer rate.

Warranty
Backed by a 3 year warranty and lifetime toll-free technical support.

Compatibility
With DOS, Windows, Windows 95, Windows NT, and OS/2 Warp.

Quality
Solutions designed for use with IBM systems covered by your IBM on-site warranty.

Selection
Designed for use in the industry's most popular portable computers.

Reliability
300,000 hours MTTF and self diagnostic capability.

Transportability
Take all your large files on the road.

Paragon Memory
pm_sales@paragonmem.com
pm_tech@paragonmem.com
www.paragonmem.com
Phone: 714-643-8844
Fax: 714-643-8855

Infinity Storage Solutions from **Paragon** provide you with a removable replacement hard drive designed and engineered specifically for your portable computer allowing you to increase your storage capacity to as much as 3 gigabytes! **Infinity Storage Solutions** replace your notebook's internal hard disk so there are no external devices, disks, or power supplies to transport.

Infinity Storage Solutions are backed by a 3 year warranty and guaranteed compatible with all supported models. **Paragon** also provides toll-free technical support for the lifetime of your Infinity storage product. In addition, **Infinity Storage Solutions** designed for use with IBM ThinkPad models are also covered by your IBM on-site warranty.

System Model to be Upgraded . . .	1.44GB		
	INFINITY P/N	INFINITY P/N	INFINITY P/N
AST			
ASCENTIA 800, 900, 910, 950	PXS-ASM2014	PXS-ASM2021	PXS-ASM1030
POWEREXEC, PREMIUM EXEC SERIES	PXS-ASM2014	PXS-ASM2021	PXS-ASM1030
COMPAQ			
LTE 5000, LTE ELITE SERIES	PCQ-EL02014	PCQ-EL02021	PCQ-EL02030
CONTURA AERO	PCQ-ASM2014	PCQ-ASM2021	PCQ-ASM2030
CONTURA 425, 420, 410, 400, 325	PCQ-ASM2014	PCQ-ASM2021	PCQ-ASM2030
ARMADA 7100, 4100 FAMILY	PCQ-ASM2014	PCQ-ASM2021	PCQ-ASM2030
DELL			
DELL LATITUDE XP, XPI, LM	PXL-LA02014	PXL-LA02021	PXL-LA01030
IBM			
THINKPAD 760 SERIES	PIB-TP02014	PIB-TP02021	PIB-TP02030
THINKPAD 701 SERIES	PIB-TP02014	PIB-TP02021	PIB-TP02030
THINKPAD 755, 750, 360, 355	PIB-TP01014	PIB-TP01021	PIB-TP01030
THINKPAD 560, 365, 350	PIB-ASM2014	PIB-ASM2021	PIB-ASM2030
NEC			
VERSA 2000, 4000, 6000 SERIES	PNC-VS02014	PNC-VS02021	PNC-VS02030
VERSA 2400, 2500 SERIES	PNC-ASM2014	PNC-ASM2021	PNC-ASM2030
VERSA E, M, P, V	PNC-VS01014	PNC-VS01021	PNC-VS01030
TOSHIBA			
TECRA 500, 510	PTS-TS02014	PTS-TS02021	PTS-TS02030
TECRA 700, 710, 720, 730, 740	PTS-TS01014	PTS-TS01021	PTS-TS01030
SATELLITE T4700, T4800, T4850	PTS-TS01014	PTS-TS01021	PTS-TS01030
SATELLITE T4900, T2450, T2400 T2130, T2110, T2100	PTS-ASM2014	PTS-ASM2021	PTS-ASM2030
PORTEGE 610, T3600, T3400	PTS-ASM2014	PTS-ASM2021	PTS-ASM2030
SATELLITE PRO 400, 410, 420, 430, 200, 310, T2155, T2150	PTS-ASM2014	PTS-ASM2021	PTS-ASM2030

Paragon Memory Corporation
Upgrade to Excellence

To Locate A Dealer Near You, Call Paragon.
[800] 643-8866

ELEKTEK	PCMall	TigerDirect	PC Zone	MicroWarehouse
800-897-1317	800-555-6255	800-888-4437	800-258-2088	800-367-7080
www.elektek.com	www.pcmall.com	www.tigerdirect.com	www.pczone.com	www.microwarehouse.com

CIRCLE 014 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

To Order, Contact One Of These Paragon

*Average street price. ©1997 Paragon Memory Corporation. All specifications subject to change without notice. Infinity is a trademark of Paragon Memory Corporation. Trademarks and registered trademarks are properties of their respective companies.

DIRT CHEAP DRIVES

1-800-786-1173

Celebrating our 10th year!
Low Low Prices!
We stock what we sell!

BEST BUY CD RECORDERS
TOLL FREE SUPPORT
5 FREE DISKS

2x6 SCSI CD ROM RECORDER
• Packet write compatible, tray loading
Drive Kit $339
Complete Kit with ISA controller $389
Complete Kit with PCI controller $449

4x6 SCSI CD ROM RECORDER
• Packet write compatible, tray Loading
Drive Kit $579
Complete Kit with ISA controller $629
Complete Kit with PCI controller $689

2x8 IDE CD ROM RECORDER
• Packet write compatible, tray Loading
Drive Kit $379
Complete Kit with ISA controller $399

2x6 SCSI CD ReWritable!
• CD-R and CD-RW compatible
• Includes 5 rewritable disks
Drive Kit $549
Complete Kit with ISA controller $599
Complete Kit with PCI controller $659
(Drive kit - requires controller)

We will not be undersold on CD media!

CDR-74 (with jewel case)	Alone	with CDR
5 pack (CDR74-5)	$27	$24
20 pack (CDR74-20)	$76	$71
50 pack (CDR74-50)	$178	$168
100 pack (CDR74-100)	$330	$320

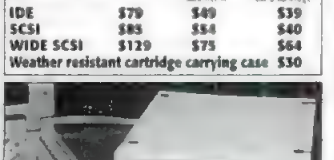
Printable Media for $1.25 more per disk!
CDR Media Color Printer $1129

CDR-74W (ReWritable)		
5 pack (CDR74W-5)	$114	$110
20 pack (CDR74W-20)	$382	$377
50 pack (CDR74W-50)	$957	$947

Call for larger quantity pricing

Converts any 3 1/2" hard drive into a removable drive. Great for transportability, data interchange, or security needs. Mount any 3.5" IDE or SCSI drive in the supplied cartridge, and the frame in a 5.25" drive bay in your computer and you are ready for transportability. Extremely high quality construction. Features built in cooling fan, SCSI ID switch

		Extra frame	Extra cartridge
IDE	**$79**	**$49**	**$39**
SCSI	**$83**	**$54**	**$40**
WIDE SCSI	**$129**	**$75**	**$64**
Weather resistant cartridge carrying case			**$30**



High quality external storage solutions available in parallel or PCMCIA (type 2) interface

Hard Drive	Parallel	PCMCIA
1.6GB	$269	$369
2.5GB	$289	$389
3GB	$319	$419
4GB	$369	$469
5GB	$459	$559
CD ROM		
16X	$159	$259
24X	$179	$279

DVD HITACHI GD-2000
• Supports CDR, and CDRW media
• IDE interface
• DVD-2 Reader, 150ms
• 20X CD ROM, 90ms

Bare Drive **$249**
Drive with PCI DVD/MPEG-2 decoder **$459**

IDE HARD DRIVES

IDE	RPM	Brand	Model	Price
1275MB	4500	Seagate	ST31277A	$152
1281MB	5200	Western Digital	AC11200	$152
1624MB	5200	Western Digital	AC21600	$163
1700MB	4500	Seagate	ST31720A	$164
1750MB	[illegible]	Maxtor	M81750A	$174
1750MB	5400	Fujitsu	MPA3017A	$162
[illegible]	4500	ITS	ITS2000	$170
[illegible]	5200	Western Digital	AC22000	$177
[illegible]	[illegible]	Maxtor	M82100A	$187
2132MB	4500	Seagate	ST32132A	$174
2300MB	**5200**	**Micropolis**	**MC4525A**	**$182**
2557MB	12ms	Seagate	ST32531A	$186
2559MB	5200	Western Digital	AC22500	$197
2560MB	[illegible]	Maxtor	M82560A	$204
2620MB	5400	Fujitsu	MPA3026A	$188
3000MB	4500	ITS	ITS3000	$199
3166MB	5200	Western Digital	AC33100	$211
3201MB	4480	Maxtor	M83201A	$219
3245MB	4500	Seagate	ST33240A	$209
3500MB	5400	Fujitsu	MPA3035A	$209
4000MB	5200	Western Digital	AC34000	$268
4000MB	5200	Micropolis	MC4540A	$246
4303MB	4500	Seagate	ST34342A	$261
4320MB	4480	Maxtor	M84320A	$285
4320MB	3600	Quantum	BF4335A	$211
4326MB	4500	Seagate	ST34340A	$259
4370MB	**5400**	**Fujitsu**	**MPA3043A**	**$242**
5000MB	5200	Micropolis	MC4550A	$321
5120MB	5400	Maxtor	M85120A	$352
5250MB	**5400**	**Fujitsu**	**MPA3052A**	**$309**
6450MB	5400	Seagate	ST36450A	$379
6480MB	3600	Quantum	BF6510A	$323
7000MB	5200	Maxtor	M87000A	$439

SCSI HARD DRIVES

Add a DPT 2044UB Ultra SCSI controller $199

SCSI	RPM	Brand	Model	Price
1050MB	5400	Seagate	ST31055N	$242
2150MB	5400	Seagate	ST32160N	$239
2151MB	5400	Quantum	FB32160S	$235
2160MB	7200	Seagate	ST32272N	$475
2275MB	7200	Quantum	VK32275S	$359
3228MB	5400	Quantum	FB33240S	$299
4300MB	5400	Micropolis	MC4743	$369
4310MB	5400	Quantum	FB34320S	$362
4400MB	7200	Fujitsu	M2954S	$559
4550MB	7200	Micropolis	MC4345	$529
4550MB	7200	Micropolis	MC4345AV	$595
4550MB	7200	Seagate	ST34572N	$689
4550MB	7200	Quantum	VK34550S	$565
4550MB	7200	Quantum	XP34550S	$669
4550MB	10,000	Seagate	ST34501N	$779
6448MB	5400	Quantum	FB36480S	$469
9100MB	**7200**	**Micropolis**	**MC3391**	**$969**
9100MB	7200	Fujitsu	M2949S	$979
9100MB	7200	Quantum	XP39100S	$989
9100MB	7200	Micropolis	MC3391AV	$1079
9100MB	7200	Seagate	ST19171N	$1059
9100MB	10,000	Seagate	ST19101N	$1179
23300MB	5400	Seagate	ST423451N	$2169

WIDE HARD DRIVES

Add a DPT 2044UWB Ultra Wide SCSI controller for $249

WIDE	RPM	Brand	Model	Price
1050MB	5411	Seagate	ST31055W	$329
2160MB	7200	Seagate	ST32272W	$510
2275MB	7200	Quantum	VK32275W	$359
4300MB	**5400**	**Micropolis**	**MC4743W**	**$389**
4400MB	7200	Fujitsu	M2954W	$569
4550MB	7200	Micropolis	MC4345W	$555
4550MB	7200	Micropolis	MC4345WAV	$619
4550MB	7200	Seagate	ST34572W	$740
4550MB	7200	Quantum	VK34550W	$565
4550MB	7200	Quantum	XP34550W	$669
4550MB	10,000	Seagate	ST34501W	$825
9091MB	**5400**	**Micropolis**	**MC3391W**	**$1089**
9091MB	5400	Micropolis	MC3391WAV	$1099
9100MB	7200	Fujitsu	M2949W	$1019
9100MB	7200	Quantum	XP39100W	$1029
9100MB	7200	Seagate	ST19171W	$1069
9100MB	10,000	Seagate	ST19101W	$1265
23300MB	5400	Seagate	ST423451W	$2299

KEEP IT COOL !

Hard Drive Cooling Fan Mounts in a 5 1/4 half height drive bay. Compatible with any 3 1/2" hard drive. Features twin cooling fans and a washable air filter. A must for 7200 and 10,000 RPM drives. (CHDFAN) $30

CD ROM DRIVES

IDE CD ROM

Speed	Brand	Model	ms	Int
12X	CyberDrive	CYBER12X	150	$79
16X	Toshiba	XM6002B	90	$87
16X	Mitsumi	CRMCFX16X	120	$92
16X	NEC	CDR1600	100	$89
18X	Acer	AC616A	120	$92
20X	Lite On	LTN202A	120	$88
24X	Panasonic	CR585	85	$104
24X	Mitsumi	CRMCFX24X	90	$109
24X	Toshiba	XM6102B	85	$115

IDE CD CHANGERS

Speed	Brand	Model	# Disks	Int
6X	NEC	CDR4X6	4	$89
8X	NEC	CDR4X8	4	$105
12X	Panasonic	SQTC512N	5	$266

ACCESSORIES

Buy a CD drive & sound card & get a FREE audio cable
Creative Labs Sound Blaster 16 Value PnP (SBIDE) $69
Creative Labs Sound Blaster AWE64 (SB64AWE) $100
Creative Labs Sound Blaster AWE64 (SB64AWEGOLD) $180
Professional speakers with Bose style swivel speakers and separate subwoofer
25 Watt ,SPEAKERJR) $99 35 Watt (SPEAKERPRO)$129
Universal sound cable(AUDIOMIX) $9
Turn any IDE CD ROM into an external for parallel printer port (PPCASECD)
Turn any IDE CD ROM into an external for PCMCIA port (PCMCIACASECD) $189

SCSI CD ROM

Speed	Brand	Model	ms	Int
12X	Toshiba	XM5701B	115	$139
12X	Plextor	PX12TS(tray)	105	[illegible]
12X	Plextor	PX12CS(caddy)	105	$259
15X	Toshiba	XM3801B	99	$159
16X	NEC	CDR1610	100	$149
20X	Plextor	PX20TS	95	$229

SCSI CD CHANGERS

Speed	Brand	Model	# Disks	
16X	Nakamichi	MJS16	5	$239

SCSI CD TOWERS		4 Drive	7 Drive
15X	Toshiba	99ms	$999	$1729
16X	NEC	100ms	$929	$1659
20X	Plextor	95ms	$1399	$2499

SCSI CD TOWERS w/ 5 Disc Changers
Nakamichi 16X 150ms $1399 $2399
Ethernet adapter option available. Call

CD RECORDERS

Sony 2x6
Internal SCSI drive (CDU926S) $309*

Yamaha 4x6
Internal SCSI drive tray load (YCDR400T) $619*
Internal SCSI drive caddy load (YCDR400) $649*

Philips 2x6
Complete kit includes software, and 1 disk
Internal SCSI (CDD2600) $399

Hewlett Packard SureStor 6020i
SureStor 6020i includes software, and 1 disk
Internal SCSI (C4343CDR) $369
Complete internal kit w/ controller (C4343CDR-1) $409
External for parallel printer port (C4345A) $545

Sony 2x8
Internal IDE (CDU928S) $349*
Kit w/ 1 disk, and software compatible with Win 95 & Win NT 3.51 & up. Req IDE controller. (CDU928SKIT) $369

Mitsumi 2x6
IDE Kit includes 3 disks, and software compatible with Win 95 & Win NT 3.51 and up. Requires IDE controller
Internal (CRMC2600TE) $415
*Drive must be purchased with CDR software or media

ULTRA IDE HARD DRIVES

FUJITSU					
1750MB	10ms	[illegible]	MP3017U	3	$167
2620MB	10ms	5400	MP3026U	3	$193
[illegible]	10ms	[illegible]	MP3035U	3	$214
4370MB	10ms	5400	MP3043U	3	$247
5250MB	10ms	5400	MP3052U	3	$314
QUANTUM					
1614MB	10ms	[illegible]	FB31620A	3	$170
2151MB	10ms	[illegible]	FB32160A	3	$181
3228MB	10ms	5400	FB33240A	3	$212
4310MB	10ms	[illegible]	FB34320A	3	$259
6448MB	10ms	[illegible]	FB36480A	3	$357
MAXTOR					
7000MB	10ms	5200	M87000D	3	$459
SEAGATE					
2111MB	12ms	4500	ST32122A	3	$177
3227MB	12ms	4500	ST33232A	3	$214
4303MB	12ms	4500	ST34342A	3	$262
WESTERN DIGITAL					
4304MB	11ms	5400	AC34300	3	$290
5160MB	12ms	5400	AC35100	3	$365

Promise PCI Ultra IDE Controller (ULTRA33) with drive **$50**

We Can: Install any of these drives in external enclosures, and custom configure to your specifications

TAPE DRIVES

EXABYTE

3.5-7Gig	8mm, 32MB/min, EXB8205XL	$1189
7-14Gig	8mm, 120MB/min, ELIANT820	$1529
7-14Gig	8mm, 60MB/min, EXB8700LT	$679
7-14Gig	8mm, 60MB/min, EXB8700	$919
.EXB8700 includes: 1 tape, 1 cleaning tape, and backup software,		
20-40Gig	8mm, 360MB/min, EXB8900	$3679
70-140Gig	8mm, 60MB/min, EXB10H	$4239

HEWLETT PACKARD

2Gig	DAT, 11MB/min, C1534AI	$579
2-4Gig	DAT-DC, 42MB/min, C1536AI	$609
4-8Gig	DDS-2 DAT, 60MB/min, C1599AI	$799
12-24Gig	DDS-3 DAT, 120MB/min, C1554AI	$1119
72-144GB	DDS 3 DAT, 120MB/min, C5648A	$2699

SEAGATE

2-4Gig	DAT-DC, 66MB/min, STD24000N	$589
4Gig	Mini, 29MB/min, TST8000	$339
4-8Gig	DDS-2 DAT, 66MB/min, STD28000N	$795
12-24Gig	DDS-3 DAT, 132MB/min, STD224000N	$1059
48-96Gig	DDS-2 DAT, 48MB/min, C4586NP	$1879

SEAGATE MINI CART
Prices include Dos/Win backup software & 1 tape
800MB TR1, TST800R $89 Parallel ver $129
3.2Gig TR3, TST3200 $179 Parallel ver $185
4-8Gig TR4, TST8000 IDE or SCSI $339

SONY $20 rebate w/ hard drive purchase

4-8Gig	DDS-2 DAT, 44MB/min, SDT5000AI	$695
4-8Gig	DDS-2 DAT, 90MB/min, SDT7000AI	$759
12-24Gig	DDS-3 DAT, 144MB/min, SDT9000AI	$1039
32-64Gig	DDS-2 DAT, 90MB/min, TSL7000X	$2099

QUANTUM

15-30Gig	DLT, 150MB/min, DLT2000XT	$2549
20-40Gig	DLT, 180MB/min, DLT4000	$3299
75-150Gig	DLT loader 150MB/min, DLT2500XT	$4849
100-200Gig	DLT loader, 180MB/min, DLT4500	$6319
105-210Gig	DLT loader, 150MB/min, DLT2700XT	$6649
140-280Gig	DLT loader, 180MB/min, DLT4700	$8249

REMOVABLE DRIVES

IOMEGA 100MB ZIP

Internal SCSI for PC (ZIP100I)	$145
Internal IDE for PC (ZIP100A,	$139
External SCSI for PC or Mac (ZIP100)	$145
External for PC parallel port (PPZIP100)	$145
100MB disks (ZIP100C) Qty 2-9/Qty 10+	$18/$14

IOMEGA 1Gig JAZ

Internal SCSI with 1 disk (JAZI)	$285
External SCSI in our case with 1 disk (JAZEX)	$348
External SCSI in Iomega case with 1 disk (JAZX)	$388
Disks Qty 2-4/5-9/10+ 1Gig	$87/$85/$82

SYQUEST 230MB Flyer

Ext. SCSI (EZ230S,	$190
Ext Parallel(EZ230P)	$190
Extra Disks Qty 2-4/5-9/10+	$28/$26/$24

SYQUEST 1.5GB SyJet

Int. SCSI (SYJET1 5PCI,	[illegible]
Ext SCSI (SYJET1 5PCI)	$459
Extra Disks Qty 2-4/5-9/10+	$86/$84/$82

OPTICAL DRIVES

FUJITSU Call about 5 Free Disks w/640MB Drives!

230MB •128MB compatible, 30ms, 3600rpm
Internal IDE w/ 1 free disk (M2541AC) $279
640MB • 230MB r/w & 128MB read compatible, 2MB buffer
Internal SCSI w/ 1 free disk (M2513A2WC) $419

MAXOPTIX
2.6Gig • (1.3Gig, 650MB r/w compatible) , 1MB buffer
Internal SCSI (TAHITI2.6) $1439

TORAY
650MB • PD drive 650MB rewritable and 4X CD ROM in one SCSI Kit w/ controller & 1 disk Int (PWX650) $349

SMART STORAGE SOLUTIONS
4.6Gig •2.6Gig compatible, 19ms
Internal SCSI & 1 disk (SSS4 6WC) $1399

Opticol Disks (LIFETIME WARRANTY) 2-4/5-9/10+

128MB	[TJ128]	$14	$12	$10
230MB	[TJ230]	$15	$13	$11
540MB 3 1/2"	[TJ540]	$28	$26	$22
640MB 3 1/2"	[TJ640]	$30	$28	$26
1.2GB 512K	[TJ1.2]	$33	$31	$29
1.3GB 1024K	[TJ1.3]	$33	$31	$29
2.3GB 512K	[TJ2.3]	$45	$43	$41
2.6GB 1024K	[TJ2.6]	$45	$43	$41

M- F 8am - 8pm, Sat 9am - 3pm CST
24hr ordering at www.dirtcheapdrives.com

VISA MasterCard

We are a major supplier to Government, Educational, Fortune 1000, and Institutions. PO's and Bids accepted.

DIRT CHEAP DRIVES
3716 Timber Drive, Dickinson, Texas 77539
Local (281) 534-4140 - Fax (281) 534-6452

Prices & specifications subject to change without notice. Shipping charges are non-refundable. All items are new condition and in original packaging. Defective items may be returned. All returns are subject to a restocking fee- no refunds on software or special orders , items not listed in ad will be. We reserve the right to refuse any sale. Personal checks held for clearance.

107797 PC Magazine

CIRCLE 283 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Insight

Everything you need

America's discount source for computers, hardware and software

System configuration can be a puzzle.

Even our customers from far away have better things to do than to spend time trying to make their system work. So let us do it for you. We have the trained technicians and the quality-controlled environment to do the job right — from the start! Upgrade your memory, install software correctly, add the right hardware — we do it all. So call us to get the system you want just the way you want it by people who know their stuff.

Western Digital

Ultra DMA/33!

...uble your ...d! 33.3MB/SEC. ...er Rates!

5.1GB Ultra IDE Hard Drive

- 5160MB capacity
- 11ms access time
- 256K cache
- 5400RPM
- 3.5" form – 1" height
- 33.3MB/second max. transfer rate
- Ultra DMA IDE interface

$379.99

WD351ØØAB

In Touch with Tomorrow

TOSHIBA

Equium 5160D System

- 166MHz Pentium® processor with MMX™ technology
- 32MB EDO DRAM
- 2.07GB hard drive
- 2MB SGRAM video/3D
- 12X CD-ROM drive
- Integrated Intel EtherExpress Pro/100B LAN adapter

$1299.99

TOE T1622

In Touch with Tomorrow

TOSHIBA

Satellite Pro 440CDX

Innovative Technology — Uncompromising Value!

- 133MHz Pentium® processor with MMX™ technology
- 256K Level 2 cache
- 12.1" FastScan display 800 x 600 resolution
- 16MB EDO DRAM (144MB max)
- 1.44GB hard drive
- FREE 33.6Kbps PC card modem

$2359.99

TA440CDx

HEWLETT PACKARD

LaserJet 6LXI Printer

HP's most affordable laser printer for business!

- 6ppm, fast return to application with 18-sec. first page out
- 600 dpi for crisp, clear output with HP's exclusive Resolution Enhancement technology (REt)
- Includes the HP Internet Custom News Kit
- 1 year manufacturer's warranty with HP Express Exchange

$389.99

HPLJ6LXI

COMPAQ

DeskPro 2000 System

Outstanding Features and Affordability

- 166MHz Pentium® processor with MMX™ technology
- 16MB SDRAM (384MB max)
- 2.1GB SMART hard drive
- S3 Trio V2/GX Enhanced 64-bit graphics
- 1MB SGRAM video
- 5 bays/5 slots
- Windows® 95

$1199.99

2787ØØ-ØØ2

For faster service mention this key code when placing your order: **MACE**

For the best prices ever on over 11,000 software titles and more product specials, visit our web site at **www.insight.com**

from start to finish.

Insight is one of only a few peripheral direct marketers to win this coveted PC Magazine Award.

MEMORY UPGRADES

PNY Industry Standard Memory	8MB		16MB		32MB	
72-Pin, 60ns (non-parity)	PY2X32-60	$39.99	PY4X32-60	$59.99	PY8X32-60	$129.99
72-Pin, 60ns (parity)	PY2X36-60	59.99	PY4X36-60	99.99	PY8X36-60	179.99
72-Pin 60ns, EDO	PY2X32-60E	39.99	PY4X32-60E	59.99	PY8X32-60E	129.99

Kingston Notebook Memory	8MB		16MB		32MB	
Toshiba Satellite Pro 400, 100CS	KTT400B/8	$99.99	KTT400B/16	$159.99	KTT400B/32	$279.99
Toshiba Tecra 700CT, CS	KTT700/8	109.99	KTT700/16	169.99	KTT700/32	299.99
Toshiba Portege 610CT; Satellite 200, 410, 420, 430; Tecra 710, 720, 730 & 740	KTT610/8	89.99	KTSP16MB	159.99	KTT610/32	279.99
Toshiba 500CS, CT	KTT650/8	89.99	KTT650/16	149.99	KTT500/32	269.99
Toshiba Portege 650CT, 660CT	KTT650/8	89.99	KTT650/16	149.99	KTT650/32	339.99
AST J10, J30	KTAST10	89.99	KTAST10	159.99	KTAST332	289.99
AST P30, P40, P50	KTAST90	89.99	KTAST916	169.99	—	—
Compaq Armada 1100 Series	KT914659	79.99	KT914660	139.99	—	—
Compaq Armada 4100 Series	KTC4100/8	79.99	KTC4100/16	149.99	KTC4100/32	279.99
IBM 760 E Series; 560; 365X, XD	KT760E/8	79.99	KT760E/16	149.99	KT760E/32	309.99
NEC Versa 6000 Series	KTNEC6000/8	89.99	KTNEC600/16	149.99	KTNEC600/32	259.99
TI Travelmate 602, 6030, 6050	KT16000/8	69.99	KT16000E/16	139.99	KT16000/32	299.99
TI Extensa 600 and 900 Series	KT600/8	69.99	KT1600/16	139.99	KT1600/32	299.99

SYSTEMS

Toshiba Models

- Equium 5160D, 166MHz Pentium® MMX, 32MB RAM, 2.07GB HDD, 12X T00T10223U — $1,299.99
- Equium 5200D, 200MHz Pentium® MMX, 32MB RAM, 2.38GB HDD, 12X T00T10230U — 1,449.99
- Equium 6200D, 200MHz Pentium® Pro, 32MB RAM, 2.95GB HDD, 12X T00T10250U — 2,139.99
- Equium 6200M, 200MHz Pentium® Pro, 32MB RAM, 4.24GB HDD, 12X T00T10260U — 2,499.99

IBM Models

- PC 300GL, 200MHz Pentium®, 32MB RAM, 2.5GB HDD IB618149 — $1,249.99
- PC 300GL, 166MHz Pentium® MMX™, 16MB RAM, 2.5GB HDD IB618151 — 1,159.99
- PC 300GL, 200MHz Pentium® MMX™, 32MB RAM, 2.5GB HDD IB618156 — 1,399.99

Compaq Models

- DeskPro 2000, 166MHz Pentium® MMX™, 16MB RAM, 2.1GB HDD 278708-002 — $1,199.99
- DeskPro 2000, 200MHz Pentium® MMX™, 16MB RAM, 2.1GB HDD 278800-002 — 1,389.99
- DeskPro 2000, 200MHz Pentium® MMX™, 32MB RAM, 3.2GB HDD, 16X 278858-002 — 1,769.99

Sony Personal Computer Models

- PCV-130, 200MHz Pentium® MMX™, 32MB RAM, 4.3GB HDD, 24X SOPCV130 — $2,099.99
- PCV-150, 233MHz Pentium® MMX™, 32MB RAM, 4.3GB HDD, 24X SOPCV150 — 2,299.99

MONITORS

Mag Innovision

- DJ530, 15"/13.9" screen/view, 800 x 600 resolution @ 85Hz, .28mm dp MV261659 — $309.99
- DJ700, 17"/16.1" screen/view, 800 x 600 resolution @ 85Hz, .26mm dp CMDJ700 — 579.99
- DJ782E, 17"/16.1" screen/view, 1024 x 768 resolution @ 75Hz, .28mm dp MV04C280 — 568.99
- DJ707, 17"/16.1" screen/view, 1024 x 768 resolution @ 85Hz, .26mm dp MV261662 — 608.99
- DJ717, 17"/16.1" screen/view, 1280 x 1024 resolution @ 85Hz, .26mm dp MV261663 — 734.99
- DJ920, 21"/19.8" screen/view, 1280 x 1024 resolution @ 85Hz, .28mm dp CMDJ920 — 1,504.99

Princeton

- EO40, 14"/13.4" screen/view, 800 x 600 resolution @ 75Hz, .28mm dp CMPGEO40 — $204.99
- EO50, 15"/13.8" screen/view, 1024 x 768 resolution @ 75Hz, .28mm dp CMPGEO50 — 278.99
- EO70, 17"/15.8" screen/view, 1024 x 768 resolution @ 75Hz, .28mm dp CMPGEO70 — 469.99
- EO72, 17"/15.8" screen/view, 1024 x 768 resolution @ 75Hz, .26mm dp CMPGEO72 — 544.99
- EO74, 17"/16" screen/view, 1024 x 768 resolution @ 75Hz, .25mm dp CMPGEO74T — 628.99
- EO75, 17"/15.8" screen/view, 1280 x 1024 resolution @ 85Hz, .26mm dp CMPGEO75 — 594.99
- EO76, 17"/16" screen/view, 1280 x 1024 resolution @ 75Hz, .25mm dp CMPGEO76T — 708.99
- EO90, 19"/18" screen/view, 1280 x 1024 resolution @ 75Hz, .26mm dp CMPGEC90 — 858.99

PRINTERS

Hewlett-Packard

- HP DeskJet 692C, 5ppm, 512K, 600 dpi HPDJ692C — $299.99
- HP DeskJet 870Cxi, 8ppm, 512K, 600 dpi HPDJ870CXI — 389.99
- HP LaserJet 6Lxi, 6ppm, 1MB, 600 dpi HPL6LXI — 389.99
- HP LaserJet 6Pxi, 8ppm, 2MB, 600 dpi HPL6PXI — 759.99

Epson

- Stylus 400, 4ppm, 720 dpi EPS400C — $199.99
- Stylus 600, 6ppm, 1440 dpi EPS600C — 299.99
- Stylus 800, 8ppm, 1440 dpi EPS800C — 449.99

Canon

- BJC-240, 4ppm, 720 dpi, 62KB CNBJC240 — $169.99
- BJC-4200, 5ppm, 720 dpi, 64KB CNBJC4200 — 249.99
- BJC-620, 4ppm, 720 dpi, 60KB CNBJC620 — 329.99

MODEMS

US Robotics

- Sportster 56K Winmodem, Internal, 56K/14.4 MBUSR1783 — $179.99
- Sportster 56K, Internal, 56K/14.4 MBUSR1787 — 199.99
- Sportster 56K, External, 56K/14.4 MBUSR1796 — 219.99
- Sportster Voice 56K, Internal, 56K/14.4 USR719168 — 219.99
- Sportster Voice 56K, External, 56K/14.4 USR719169 — 239.99
- Courier V.Everything, Internal, 56K/14.4 USR499463 — 259.99
- Courier V.Everything, External, 56K/14.4 USR499459 — 279.99

HARD DRIVES

Western Digital Hard Drives

- 1280MB IDE Caviar, 11ms access, 128K cache, 5,200 RPM, 16.6MB/sec WD1128BAB — $165.99
- 1620MB IDE Caviar, 12ms access, 128K cache, 5,200 RPM, 16.6MB/sec WD2160BAB — 179.99
- 2080MB IDE Caviar, 11.5ms access, 128K cache, 5,200 RPM, 16.6MB/sec WD2280BAB — 189.99
- 3166MB IDE Caviar, 12ms access, 128K cache, 5,200 RPM, 16.6MB/sec WD3310BAB — 229.99
- 4000MB IDE Caviar, 12ms access, 256K cache, 5,200 RPM, 16.6MB/sec WD3480BAB — 289.99
- 5160MB IDE Caviar, 11ms access, 256K cache, 5,400 RPM, 33.3MB/sec WD3510BAB — 379.99
- 2170MB SCSI Enterprise, 8ms access, 512K cache, 7,200 RPM, 20MB/sec WD2170BSB — 459.99
- 4360MB SCSI Enterprise, 8ms access, 512K cache, 7,200 RPM, 20MB/sec WD4360BSB — 649.99

Seagate Hard Drives

- 1277MB IDE Medalist, 12ms access, 128K cache, 4,500 RPM, 16.6MB/sec ST31277AB — $159.99
- 1700MB IDE Medalist, 12ms access, 128K cache, 4,500 RPM, 16.6MB/sec ST31720AB — 169.99
- 2120MB IDE Medalist, 12ms access, 128K cache, 4,500 RPM, 16.6MB/sec ST32122AB — 185.99
- 2520MB IDE Medalist Pro 2.5, 11ms access, 128K cache, 5,400 RPM, 16.6MB/sec ST52520AB — 209.99
- 3200MB IDE Medalist, 12ms access, 128K cache, 4,500 RPM, 16.6MB/sec ST33232AB — 219.99
- 4340MB IDE Medalist, 12ms access, 128K cache, 4,500 RPM, 33.3MB/sec ST34342AB — 279.99
- 6450MB IDE Medalist, 9.5ms access, 512K cache, 5,400 RPM, 16.6MB/sec ST36450AB — 399.99
- 1050MB SCSI Hawk 2XL, 9ms access, 512K cache, 5,411 RPM, 20MB/sec ST31055NB — 329.99
- 2149MB SCSI Hawk 2XL, 9ms access, 512K cache, 5,400 RPM, 20MB/sec ST32155NB — 399.99
- 4350MB SCSI Barracuda 4LP, 8ms access, 512K cache, 7,200 RPM, 20MB/sec ST34371NB — 719.99
- 4550MB SCSI Cheetah, 8ms access, 512K cache, 10,000 RPM, 20MB/sec ST34501NB — 919.99
- 9100MB SCSI Barracuda 9, 8ms access, 512K cache, 7,200 RPM, 40MB/sec ST19171WB — 1,249.99
- 23400MB SCSI Elite 23, 13ms access, 2048K cache, 5,400 RPM, 20MB/sec ST423451NB — 2,689.99

NOTEBOOKS

Toshiba

- Libretto 50CT, 75MHz Pentium®, 6.1" TFT, 16MB RAM, 810MB HDD TA50CT — $1,929.99
- Satellite Pro 220CDS, 133MHz Pentium®, 12.1" DSTN, 16MB RAM, 1.34GB HDD, 10X TA220CDS — 1,899.99
- Satellite Pro 440CDT, 133MHz Pentium® MMX™, 12.1" TFT, 16MB RAM, 1.44GB HDD, 10X TA440CDT — 2,799.99
- Satellite Pro 460CDT, 166MHz Pentium® MMX™, 12.1" TFT, 32MB RAM, 2.1GB HDD, 10X TA460CDT — 3,659.99
- Portégé 300CT, 133MHz Pentium® MMX™, 10.4" TFT, 32MB RAM, 1.51GB HDD TA300CT — 3,369.99
- Portégé 660CDT, 150MHz Pentium®, 11.3 TFT, 16MB RAM, 1.35GB HDD, 10X TA660CDT — 3,899.99
- Tecra 500CDT, 120MHz Pentium®, 12.1" TFT, 16MB RAM, 1.26GB HDD, 6X TA500CDT — 1,999.99
- Tecra 510CDT, 133MHz Pentium®, 12.1" TFT, 16MB RAM, 2.1GB HDD 10X TA510CDT — 2,699.99
- Tecra 520CDT, 166MHz Pentium® MMX™, 12.1" TFT, 32MB RAM, 2.0GB HDD, 10X TA520CDT — 4,159.99
- Tecra 530CDT, 166MHz Pentium® MMX™, 12.1" TFT, 32MB RAM, 2.0GB HDD, 10X TA530CDT — 4,579.99
- Tecra 730XCDT, 150MHz Pentium® MMX™, 12.1" TFT, 16MB RAM, 2.02GB HDD, 10X TA730XCDT — 3,499.99
- Tecra 740CDT, 166MHz Pentium® MMX™, 13.3" TFT, 16MB RAM, 2.02GB HDD, 10X TA740CDT — 4,659.99
- Tecra 740CDT, 166MHz Pentium® MMX™, 13.3" TFT, 16MB RAM, 3.0GB HDD, 10X TA740CDT(K) — 4,849.99
- Tecra 740CDT, 166MHz Pentium® MMX™, 13.3" TFT, 16MB RAM, 3.0GB HDD, 10X TA740CDT(W) — 4,999.99

IBM

- ThinkPad 380, 150MHz Pentium®, 12.1" DSTN, 16MB RAM, 1.08GB HDD, 8X IBT26351BU — $1,729.99
- ThinkPad 380D, 150MHz Pentium®, 12.1" DSTN, 16MB RAM, 1.35GB HDD, 8X IBT26352AU — 1,999.99
- ThinkPad 380D, 150MHz Pentium® MMX™, 12.1" TFT, 16MB RAM, 2.1GB HDD, 8X IBT26353AU — 3,249.99
- ThinkPad 560, 133MHz Pentium®, 11.3" DSTN, 8MB RAM, 2.1GB HDD IBT26481BU — 1,749.99
- ThinkPad 560, 133MHz Pentium®, 12.1" TFT, 8MB RAM, 2.1GB HDD IBT26482BU — 2,899.99
- ThinkPad 560E, 150MHz Pentium® MMX™, 11.3" DSTN 16MB RAM, 2.1GB HDD IBT26483BU — 2,599.99
- ThinkPad 560E, 166MHz Pentium® MMX™, 12.1" TFT, 16MB RAM, 2.1GB HDD IBT26484BU — 4,189.99
- ThinkPad 760ED, 133MHz Pentium®, 12.1" TFT, 16MB RAM, 2.1GB HDD, 6X IBT9546UPA — 3,699.99
- ThinkPad 760E, 150MHz Pentium®, 12.1" TFT, 16MB RAM, 2.1GB HDD IBT9546UPB — 3,499.99
- ThinkPad 760XD, 166MHz Pentium® MMX™, 12.1" TFT, 32MB RAM, 3.0GB HDD, 8X IBT9546UPE — 4,739.99
- ThinkPad 760XL, 166MHz Pentium® MMX™, 12.1" TFT, 16MB RAM, 2.1GB HDD IBT9547UPC — 3,865.99
- ThinkPad 760XL(NT), 166MHz Pentium® MMX™, 12.1" TFT, 32MB RAM, 2.1GB HDD IBT9547UPN — 4,069.99
- ThinkPad 765L, 166MHz Pentium® MMX™, 13.3" TFT, 32MB RAM, 3.0GB HDD IBT9547UPJ — 6,199.99
- ThinkPad 765D, 166MHz Pentium® MMX™, 13.3" TFT, 32MB RAM, 3.0GB HDD, 8X IBT9546UPH — 6,799.99

Compaq

- Armada 1530DM, 133MHz Pentium® MMX™, 12.1" DSTN, 16MB RAM, 1.44GB HDD, 10X 304958-005 — $2,459.99
- Armada 1550DMT, 133MHz Pentium®, 12.1" TFT, 16MB RAM, 1.4GB HDD, 10X 255158-005 — 2,999.99
- Armada 1580DMT, 150MHz Pentium® MMX™, 12.1" TFT, 16MB RAM, 2.1GB HDD, 10X 291558-005 — 3,479.99
- Armada 4131T, 133MHz Pentium®, 12.1" TFT, 16MB RAM, 1.4GB HDD 259308-481 — 2,599.99
- Armada 7330T, 150MHz Pentium® MMX™, 12.1" TFT, 16MB RAM, 2.1GB HDD 273158-004 — 3,782.99
- Armada 7350MT, 166MHz Pentium® MMX™, 12.1" TFT, 32MB RAM, 2.1GB HDD 273168-004 — 3,709.99
- Armada 7710MT, 150MHz Pentium® MMX™, 12.1" TFT, 16MB RAM, 1.6GB HDD 226787-002 — 3,709.99
- Armada 7730MT, 166MHz Pentium® MMX™, 12.1" TFT, 32MB RAM, 2.1GB HDD 277786-003 — 4,349.99
- Armada 7750MT, 166MHz Pentium® MMX™, 12.1" TFT, 32MB RAM, 2.1GB HDD 226806-003 — 4,939.99

ETHERNET ADAPTERS & PRINT SERVERS

3Com

- Fast EtherLink XL, TP, PCI 3WC905TX — $89.99
- EtherLink III, ISA, 10Base T (10Base-T, RJ-45 only) 3WC509TPO — 59.99
- EtherLink III, ISA, 10Base-TPC (10Base-T, BNC, RJ-45) 3CM509517 — 69.99
- Fast EtherLink XL, Cardbus, PCMCIA 3CM609058 — 153.99
- Fast EtherLink XL, Cardbus, 56K Megahertz Kit 3CM06347 — 399.99
- EtherLink III LAN+33.6 F/M, PCMCIA 3CM609036 — 264.99
- EtherLink III, TP, PCMCIA 3CM587B05 — 129.99

Intel

- EtherExpress PRO/10+, TP, ISA INWM82258 — $57.99
- EtherExpress PRO/10+, TP, PCI INWM8520 — 79.99
- EtherExpress PRO/100, TP/TX, PCI INWM8465B — 79.99
- EtherExpress PRO/100, PCMCIA IT595439 — 159.99
- NetportExpress PRO/100, 3 ports INWM2451 — 379.99
- NetportExpress PRO/100, 1 port IT595446 — 269.99

MAG INNOVISION

$579.99

CMDJ700

DJ700 17" Monitor

- 17"/16.1" screen/viewable size
- Flat square technology CRT
- .26mm dot pitch: 1024 x 768 @ 85Hz
- JAG™ On-Screen display
- 3 year manufacturer's warranty

IBM Business Partner

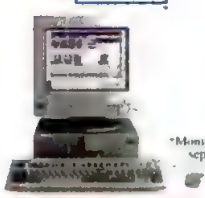
$1999.99

IBT26352AU

ThinkPad 380D Notebook

- 150MHz Pentium® processor with 256K Level 2 cache
- 12.1" Dual Scan display
- 16MB EDO DRAM (80MB max)
- 1.35GB hard drive; 8X CD-ROM

IBM Business Partner



*Monitor sold separately

$1159.99

IB618151

PC 300GL System

- 166MHz Pentium® processor w/MMX™ technology and 256K Level 2 cache
- 16MB EDO DRAM; 4MB video
- 2.5GB SMART hard drive
- Wake-on-LAN capabilities
- Windows® 95/3.11 option

CIRCLE 278 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

For faster service mention this key code when placing your order **MACE**

PCMall

The Mall With It All...For Less!

We Will Beat Any

We'll beat any price from any authorized catalog reseller on any CPU we offer.

COMPAQ Notebooks and Desktops!

Powerful Compaq Notebook and Desktop Features at an Ultra-Low Price!

Compaq Presarios

as low as $799! #97918

Presario 4000
Monitors sold separately.

Presario 2200

Order#	Model	Pentium® processor	RAM	HD	CD	Modem	Price
#97918	2200	180MHz Media GX	16MB	1.6GB	8XCD	33.6	$799
#97471	4504	200MHz	16MB	2.1GB	16XCD	33.6	$999
#97469	4508	200MHz w/MMX	24MB	3.2GB	16XCD	33.6	$1,499
#97470	4528	233MHz w/MMX	32MB	3.2GB	24XCD	33.6	$1,899
#97444	4814	233MHz w/MMX	32MB	6.5GB	24XCD	33.6	$2,299
#97468	4824	233MHz w/MMX	32MB	6.5GB	24XCD	33.6	$2,699

Presario NoteBooks

- 12.1" high-contrast DSTN/TFT display
- 150MHz Pentium® processor or 150 and 166MHz Pentium® processor w/MMX™ technology
- 128-bit accelerated graphics
- 16MB SyncDRAM; 80MB max
- Premier Sound Audio System
- 14X Max4 CD-ROM drive
- 1.4GB/1.6GB hard drive

as low as $2,299! #97787

Integrated 14X Max 4 CD-ROM drive, modem and diskette drive means you don't have to swap out devices.

Order#	Model	Pentium® processor	RAM/HD/CD	MODEM	Display	Price
#97787	1210	150MHz	16MB/1.4GB/14X	33.6K	12.1" DSTN	$2,299
#97786	1610	150MHz w/MMX	16MB/1.6GB/14X	56K	12.1" DSTN	$2,699
#99531	1620	166MHz w/MMX	16MB/2.1GB/20X	56K	12.1" STN	$2,899
#98234	1000	166MHz w/MMX	16MB/1.4GB/10X	33.6K	12.1" TFT	$3,299

DeskPro 2000 Series

- 166MHz, 200MHz or 233MHZ Pentium® processor w/ MMX™ technology
- 16 or 32MB RAM
- Up to 3.2GB HD
- 16X CD-ROM
- 3D acceleration
- 2MB VRAM

as low as $1,239! #97422

Monitor is sold separately
DeskPro 4000 & 6000 also available please call.

MMX™ technology

Order#	Model	Pentium® processor w/MMX™ technology	RAM	HD	CD	Housing	Price
#97422	5166x/2100	166MHz	16MB	2.1GB		Dsktp	$1,239
#97423	5166x/3200	166MHz	16MB	3.2GB		Dsktp	$1,389
#97424	5166x/3200/CDS	166MHz	16MB	3.2GB	16X	MTwr	$1,599
#97425	5200x/2100	200MHz	16MB	2.1GB		Dsktp	$1,389
#97426	5200x/3200	200MHz	32MB	3.2GB		Dsktp	$1,579
#97427	5200x/3200/CDS	200MHz	32MB	3.2GB	16X	MTwr	$1,769
#97428	5233x/3200/CDS	233MHz	32MB	3.2GB	16X	Dsktp	$1,949

TOSHIBA Notebooks & Desktops

as low as $1,699!

MMX™ technology

Monitor Sold Separately

TECRA™ Notebook Series

Order#	Model	Pentium® processor	RAM	HD	CD	Display	Wt (lb.)	Price
#87602	510CDT	133MHz	16MB	2.02GB	10XCD	12.1" TFT	8.4	$2,899
#97054	520CDT	166MHz w/MMX*	32MB	2.0GB	10XCD	12.1" TFT	8.4	$4,299
#90505	740CDT	166MHz w/MMX*	16MB	2.02GB	10XCD	13.3" TFT	8.4	$4,799
#87095	530CDT	166MHz w/MMX*	32MB	2.0GB	10XCD	12.1" TFT	8.4	$4,599

Satellite™ Notebook Series

Order#	Model	Pentium® processor	RAM	HD	CD	Display	Wt (lb.)	Price
#96390	220CDS	133MHz	16MB	1.44GB	10X	12.1" DSTN	7.1	$1,899
#97050	440CDX	133MHz w/MMX*	16MB	1.44GB	10X	12.1" HCAD	6.9	$2,399
#97051	440CDT	133MHz w/MMX*	16MB	1.44GB	10X	12.1" TFT	6.9	$2,949
#97052	460CDT	166MHz w/MMX*	32MB	2.0GB	10X	12.1" TFT	6.9	$3,849

*"Intel Pentium® processor with MMX™ technology versions

Infinia Desktop Series

Order#	Model	Pentium® Processor	RAM	HD	CD	Modem	Cache	Price
#99437	7202	200MHz w/MMX*	32MB	4GB	16X	56K	256KPB	$1,699
#99435	7230	233MHz w/MMX*	64MB	6.46GB	24X	56K	256KPB	$2,299
#99431	7231	233MHz	64MB	4GB	DVD-ROM	56K	256KPB	$2,699
#99433	7260	266MHz	64MB	6.4GB	24X	56K	256KPB	$2,899

IBM Save $$$ on Notebooks and Desktops

as low as $1,749! #94279

ThinkPad 380 Series

- 12.1" DSTN/TFT SVGA display with IBM's exclusive Tech-Wide Angle
- Full-size 85-key keyboard with palm rest and Track Point with QuickStop finger control

Exclusive! Get a FREE 2X Sony® Discman® with Your Purchase of a ThinkPad 380
Item #94279
While supplies last.

Order#	Model	Pentium® processor	RAM/HD/CD	Display	Weight (lb.)	Price
#94279	380	150MHz	16/1.08GB	12.1" DSTN	6.8	$1,749
#94278	380D	150MHz MMX*	16/2.1GB/8X	12.1" TFT	8.9	$3,259

New! IBM Notebooks 380E and 770 Series

380E Notebook Series

Order#	Model	Pentium® Processor	RAM	HD	CD	Display	Wt (lb.)	Price
#99917	380E	150MHz w/MMX*	16MB	2.1GB	–	12.1" FRSTN	6.7	$2,199
#99913	380ED	166MHz w/MMX*	16MB	2.1GB	20XCD	12.1" FRSTN	7.0	$2,899
#99915	380ED	166MHz w/MMX*	16MB	3.0GB	20XCD	12.1" TFT	7.11	$3,799

IBM 770 Notebook Series

Order#	Model	Pentium® Processor	RAM	HD	CD	Display	Wt (lb.)	Price
#99910	770	233MHz w/MMX*	32MB	5.1GB	–	14.1" TFT	7.8	$7,199
#99908	770	233MHz w/MMX*	32MB	4GB	–	13.3" TFT	7.4	$5,799
#99904	770	200MHz w/MMX*	32MB	3.2GB	–	13.3" TFT	7.4	$4,899

FUJITSU Lifebook 435DX

- 133MHz Pentium® processor w/MMX™ technology
- 12.1" SVGA DSTN color display
- 16MB RAM (max 80MB)
- 1.3GB hard drive
- 10X Modular CD-ROM drive
- 16-bit Stereo sound w/ 2 speakers & microphone
- MPEG-1 full-motion video playback & Zoom Video
- 2 Type II/I Type III PCMCIA slots
- Lithium-ion battery
- Weight 7.3 lbs.

as low as $1,799! #99287

intel inside pentium

#99287 436Dx 133MHz Pentium® processor w/MMX™, 16MB RAM, 1.3GB HD, 10X CD, 12.1" DSTN $1,799

SONY Ultra-Slim Multi Media Notebooks!

- 150MHz or 166MHz Pentium® processor w/ MMX™ technology
- 12.1" SVGA Active Matrix LCD Display
- 16 or 32MB SD-RAM, 128MB max.
- Ultra-slim profile (1.5"), weighing only 5.5lbs
- Removable 2.1 GB HD
- Integral 33.6Kbps modem 14.4/Kbps fax with Built-in speaker phone
- "Sony Tuned" MPEG Digital Video Playback
- Removable 14.5X CD-ROM drive
- Remote Control Headphones

as low as $3,499! #99720

intel inside pentium

Notebooks

Order#	Model	Pentium® processor	RAM/HD/CD	Display	Modem	Price
#99720	PCG-N5C	150MHz MMX™	16/2.1GB/14.5X	12.1" DS	33.6K	$3,499
#99508	PCG-N7C	166MHz MMX™	32/2.1GB/14.5X	12.1" TFT	33.6K	$4,499

Accessories

Order#		Price
#99722	Personal docking Station	$299
#99721	AC Adapter	$89
#99723	16MB Expansion Memory	$199

HEWLETT PACKARD HP Pavilion Blowout!

HURRY!!! Limited Supply!

intel inside pentium

Monitor sold separately

HP Pavilion 7320 PC

- 166MHz Pentium® processor w/MMX™ technology
- 16MB RAM (Exp. to 128MB)
- 2.1GB hard drive
- 256k pipeline burst cache
- 33.6Kbps DSVD fax/data modem
- 16X Max CD
- HP/Altec Lansing speakers
- Factory Refurbished—90 Day warranty

While supplies last! only $949 #13774

HP Pavilion 7360 PC

- 200MHz Pentium® processor w/MMX™ technology
- 32MB RAM (Exp. to 128MB)
- 2.5GB HD 256K pipeline burst cache
- 33.6Kbps DSVD fax/data modem
- 16X Max CD
- HP/Altec Lansing speakers
- Factory Refurbished—90 Day warranty

only $1,299 #13786

#98226 17" HP Pavilion Multimedia Monitor (Fac. Refur.) (.28mm) $399

Open 24 Hours

$1.8 Billion Inventory Available!

Over 45,000 Products!

Custom Configuration!

Fastest Overnight Delivery!

FedEx Federal Express

Computer Price!

Call us before you order from anyone else. We want your business.

HP LaserJet Printer Blowout!

HP LaserJet 5 Printer
600dpi up to 12ppm
Factory Refurbished

LaserJet 5 Printer $899.99 #98785

5L Xtra Printer $299.99 #98141

HP LaserJet 5Lxtra Printer
600dpi up to 4ppm
Factory Refurbished

While Supplies Last!

Order#	Product	Price
#98786	HP LaserJet 6P printer (factory refurbished)	$699**
#94083	HP LaserJet 6MP printer (factory refurbished)	$799**
#97457	HP LaserJet 5M printer (factory refurbished)	$1299**
#98784	HP DeskJet 1600C color printer (factory refurbished)	$799**

Lexmark Optra S1250 Laser Printer

New Low Price!

- 1200 x 1200dpi
- 12ppm
- Postscript®, PCL6

Optra S1250 $1,028.99 #96779

#96870	Optra S1250n	$1316**

Removeable Drive Deals!

Fuji 100MB Zip Disks
when you buy a 10 pack
now only $9.99 ea. #87482
Price after $20 mail-in rebate

SuperDisk LS-120 Floppy Drive — Arriva
- Store 120MB on a floppy drive
- Downward compatible with both 1.44MB and 720KB floppies
- Provides 83 times the storage capacity of standard 1.44MB diskettes

$149.99 PC Mail Price
-50.00 Mail-in Rebate
$99.99 Your final cost after rebate*
#98230 Internal unit

External unit pictured

Jaz Insider 1GB Drive
w/FREE Gravity Internet Newsreader Software
only $299.99 #98021

#98022 Jaz 1GB External w/ Gravity Newsreader $399**

Western Digital Blowout!

1.2GB EIDE Hard Drive
- 11MS Access Time
- Easy installation

only $149.99 #87783

Order#	Manufacturer	Product	Price
#98810	Maxtor	Crystal Max/2 1GB EIDE	$188**
#95264		Crystal Max 3.0GB EIDE	$224**
#90693		Medalist 1720/1.7GB/EIDE	$182**
#92137		Medalist 2132 2.1GB EIDE	$184**
#92185	Seagate	Barracuda 2.1GB Ultra SCSI	$508**
#90251		Barracuda 4.3GB Ultra SCSI	$751**
#82744		Fireball 3.2GB EIDE	$288**
#92187	Quantum	M 16XX Series 1.7GB/EIDE	$185**
#92188		M 16XX Series 2.1GB/EIDE	$189**
#90695	FUJITSU	Caviar AC22100 2.1GB EIDE	$194**
#90696		Caviar AC22100 4.0GB EIDE	$322**
#92383	Western Digital	Enterprise 2.1GB/SCSI-3	$451**
#97950		Enterprise 4.3GB/Ultra SCSI	$659**

PowerQuest Drive Copy #98473 (3.5" Kit Available)

PNY · Simple Technology · Kingston Technology

Give Your CPU a Performance Boost!
Your #1 Source for Memory

4MB as low as $24 #4088
8MB as low as $39 #4177
16MB as low as $59 #95418

Order Memory Today From PC Mall and Receive FREE*—your choice of First Aid or Oil Change or Uninstaller

Ask for item #96746 · Ask for item #97069 · Ask for item #97057

*$4.99 S&H fee applies

Smart One 56K Modem
Internal Modem
only $99.99 #93029

56K PC Card Modem
only $138.99 #91510

Fastest Modem Ever...56Kbps!

as low as $147.99*

Order#	Product	Price
#97968	Sportster 56K External Fax Modem	$167**
#97967	Sportster 56K Internal Fax Modem	$147**
#98437	Sportster 33.6 External Fax Modem	$118**
#98436	Sportster 33.6 Internal Fax Modem	$88**

*After $50 mail-in rebate. Rebate expires 10/04/97.
**After $20 mail-in rebate. Rebate expires 10/04/97.

FREE WebPainter(a $99 Value) w/any modem purchase!

3Com · Life Time Warranty

OfficeConnect Hubs as low as $68.99

- Installs in under 10 minutes
- 4, 8 or 16 RJ-45 10Base-T connections
- Ergonomic design saves space and ensures silent operation

Order#	Product	Price
#98096	TP4 4-Port 10Base-T Hub, (4) RJ-45	$68**
#98097	TP4/Combo 4-Port 10Base-T Hub, (4) RJ-45, (1) BNC, (1) AUI	$98**
#81612	8TPO 8-Port 10Base-T, (8) RJ-45	$104**
#81613	8TPC 8-Port 10Base-T, (8) RJ-45 with BNC Uplink	$148**
#81614	8TPM 8-Port 10Base-T, (8) RJ-45, Manageable, with BNC Uplink	$368**
#98098	TP16C 16-Port 10Base-T Hub, (16) RJ-45, (1) BNC	$244**
#87046	8TP100 8-Port 100Base-TX, (8) 100/RJ-45	$598**

SONY DiscMan® Special Offer!

- 2X, 300KB/sec transfer rate, 380ms access
- PCMCIA type II card
- Includes stereo adapter, headphones and AC adapter
- Plays audio CDs too!

While Supplies Last!

Discman® only $79.99 #90667

Factory refurbished, 90-day warranty

Iomega Zip Drive Blowout!

$89.99 Price reflects $10 mail-in rebate from PC Mall through 10/31/97

#13785 Parallel, external factory refurbished

Iomega® 100MB Zip Drive
1-Year Warranty, While supplies last.

#13786 Zip 100MB Parallel Drive $109.99
Price reflects $20 mail-in rebate from PC Mall through 10/31/97

Ask About Our Great Zip Media Offers!

Princeton Monitor Blowout!

17" Color Ultra 72 Monitor
- .28dpi, 1024 x 768 resolution

only $399.99 #99724

FREE! Carrying Case

w/Any Notebook Purchase! A $9** Shipping and Handling charge applies. Bag shipped may vary slightly from that shown

FREE! ISA Combo Ethernet Adapter

w/Any Desktop Purchase! Pay only $9** for Shipping and Handling. Ask for #98084

No Credit Card Surcharges

VISA · MasterCard · American Express · Discover

We accept Visa, MasterCard, American Express and Discover!

Prices and specifications subject to change without notice. Limited to stock on hand. IMPORTANT: While we do our best to check errors, mistakes may occur—call to verify pricing.

Open Account. PC Mall offers Net 15 day terms to governments, schools and businesses with instant approval to qualified customers. Your Personal Account Executive can assist you in your application. Please allow up to 3 days for credit approval.

Leases. Lease anything from one PC to one hundred for truly affordable rates!

Volume Licensing. Supply your entire office with the latest software versions for less!

Call for Details!

Order And Register to **Win a NEW Mercedes SLK!**
No purchase necessary. Call for details

CIRCLE 330 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Call Today to get Your FREE PC Mall and DataComm Mall Catalogs!

Order Any Time! Open 24 Hours.

1-800-681-3282

Order Today by 11 pm EST—Get It Tomorrow by 10:30 am

www.pcmall.com Use Source Code #ZPCM7A1

Ask Our Advisors

HARDWARE

Disk Dilemma

I'm using Windows 95 on a 486DX2-66 system with 16MB of memory, and I'm running out of disk space. I'd like to add a 1.2GB hard disk, but the manufacturer said I'd need to replace the motherboard in order to add the larger disk. I'm retired, but I am a tax preparer and can make a little extra money doing returns during tax season. I need the extra disk space for the return information. Do you know whether there is some way I could add an external drive?

BILL GAUSMAN
Bridgeview, Illinois

PC MAGAZINE: It's a little puzzling that the manufacturer said you'd need a motherboard upgrade to accommodate the new hard disk; the most likely reason is that your current system may not support LBA (Large Block Addressing), which makes it possible to install hard disks larger than 504MB. There are other ways to reach the same goal, and you may want to consider an entirely different approach, in any case.

You can add LBA support to your system through either hardware or software. The software approach uses special drivers that the system loads as part of the boot processes, and many disk manufacturers and vendors include such software with their large disks. The problem is that you can lose access to your hard disk data if the driver software becomes damaged somehow.

A more conservative approach is to get a hard disk controller that provides LBA support through its own on-board BIOS. You can get such an interface for EIDE drives from a number of manufacturers. It doesn't require any separate software drivers, because the card provides the necessary instructions. (You should note that most SCSI interfaces perform a similar function for SCSI hard disks.)

As an alternative, however, you might want to consider using a removable media drive instead of a fixed hard disk. The initial cost will be a little higher, but for a relatively low price per megabyte, you'll be able to add an endless amount of storage: As the number of tax clients grows, you can simply purchase more cartridges to hold the additional data. This approach also lets you store copies of sensitive client data in a secure location. *—Alfred Poor*

The Delinquent Drive

I am running Windows 95, and I am having problems with my CD-ROM drive: Whenever I try to install a program from the drive, I get an error message. I know the CDs are okay, because they work on other computers. The drive is a 4X EIDE model, and the problem occurs even when I load up in my old version of DOS. I would appreciate any help you could give me.

MAUD MORSHEDI
via the Internet

PC MAGAZINE: There are two possible causes of the problem: Either your CD-ROM drive is dirty, or it is damaged and out of specification.

The first step is to determine whether the drive can read any CDs at all. Your letter indicates that more than one data CD won't work in the drive but that they all work in another system. Try playing an audio CD in the drive; the data is stored in a similar manner, but the drive spins only one-quarter as fast as with a data CD.

If the audio CD won't play, dirt in the drive could be the cause. Follow the disk drive manufacturer's recommendations for cleaning the drive's read head. If you don't have any instructions, you can try using a CD cleaner kit, which you can purchase at most music stores. If that solves the problem for the audio CD, then it may also fix it with the data CDs.

If the drive fails to play the audio CD, then it is probably in need of repair. The read-head alignment mechanism may not be adjusted correctly, or the motor may not be able to maintain the correct speed. You can purchase a new 4X drive (or a faster one) for less than $100, so it may be easier simply to purchase a replacement than to try to get your current drive repaired.—*Alfred Poor*

OPERATING ENVIRONMENTS

The Case of the Disappearing Taskbar

I was adjusting my screen resolution, switching between 640-by-480 and 800-by-600. Then I noticed my Taskbar was gone. I had read that all you need to do is look for a gray line and use your mouse to pull the line up, but the gray line is not visible on my display. My keyboard includes a key that pops up the Start menu, and when I press the key, the Start menu does indeed pop up on the bottom of my screen, so I know it's there. But I can't find a way to make the Taskbar visible again. Do you have any suggestions?

ROBERT B. JONES
via the Internet

PC MAGAZINE: You can dock the Taskbar on any edge of the screen simply by dragging it to that edge, and you can adjust its height (or width, if it's vertical). Windows 95 uses the Registry to remember which edge you've chosen for docking the Taskbar, storing the Taskbar's height or width as the distance from the opposite edge. The system is supposed to manage this data and should change the information as needed when you adjust the display resolution. Most of the time this works, but when it doesn't, you have a real problem. In this case, the Taskbar is docked along the bottom edge, and the value stored for its distance from the top edge is greater than the screen height. Thus the Taskbar is entirely off-screen.

You need to force the system to recalculate the Taskbar's position, taking into account the current display resolution. Fortunately, you can do that fairly easily. Bring up the Start menu by pressing Ctrl-Esc (or the special key on your keyboard), choose Settings, and

OUR ADVISORS

Alfred Poor *is a contributing editor and the author of* The Underground Guide to Hardware.

Brian Proffit *is a contributing editor of* Computing Today *and the author of* OS/2 Warp Survival Kit.

Sal Ricciardi *is a contributing editor and the author of the* Running FoxPro *series from Microsoft Press.*

Neil J. Rubenking *is a contributing technical editor and author of* Delphi Programming for Dummies.

Luisa Simone *is a contributing editor and the author of* Microsoft Publisher by Design.

Craig Stinson *is a contributing editor and the coauthor of* Running Windows 3.1 *and* Running Microsoft Excel.

M. David Stone *is a contributing editor and the coauthor of* Word for Windows Companion, *Second Edition.*

choose Taskbar. In the Taskbar Properties dialog, toggle the check box labeled Auto Hide. That is, if it's not checked, check it; if it's checked, clear the check mark. Click OK. That should bring the Taskbar back into view. Now go back and restore your preferred value for the Auto Hide check box.—*Neil J. Rubenking*

WORD PROCESSING

Foldover Booklets in Word

Microsoft Word 7 doesn't offer a way to print foldover booklets. The format requires printing on both sides of the paper in landscape mode with two booklet pages on each side. Once the pages are printed, you fold the paper to get a 5.5- by 8.5-inch book format. I seem to recall mention of a macro to convert a file to this format. If this macro exists, where can I find it?

James Pfeiffer
New York, New York

PC MAGAZINE: The macro you've heard about is officially for Word 6 only. In my tests, it worked just as well with Word 7.

You can find the macro on Microsoft's Web site at *www.microsoft.com/kb/softlib/*. Find the file Wd1025.exe, a self-extracting archive containing this and other macros. After you download and decompress the archive, you'll see the file Install.doc.

Install.doc is a template. If you open the file with Word, the program will ask whether you wish to install the supplemental macros. (It will also trigger a warning if you have virus protection for Word macro viruses. You can ignore the warning.) Choose to install the macros; Install.doc will add a new template and define it as a new global template, which you can see on the list of Global Templates And Add-Ins by choosing File | Templates. Install.doc will also add a new toolbar with buttons for the supplemental macros to the Normal template.

Alternatively, you can import just the one macro into your Normal template. Open any file, choose File | Templates, click the Organizer button to open the Organizer dialog box, and choose the Macros tab. If you started from a file with Normal attached, you'll see two identical lists, both showing the macros in Normal.dot. If the document has another template attached, one list will show the macros in Normal.dot, and one will show the macros in the second template.

Choose one of the two Close File buttons, leaving Normal open on one side. The Close File button will change to an Open File button. Choose that button to go to the Open dialog box, and navigate to the Install.doc file. (You'll have to change the entry in the Files Of Type box from the default *.dot to *.doc.) Highlight Install.doc and choose Open.

Word will return you to the Organizer dialog box with the list of macros in Normal.dot showing on one side and the macros in Install.doc showing on the other. Highlight FormatFoldOverBooklet in the Install.doc list and copy the macro to Normal.dot. Choose Close to return to your document.

There is a known problem in the macro that will give you a syntax error if you use Set Document Margins. To fix the macro, choose Tools | Macro, highlight the macro name FormatFoldOverBooklet, and choose Edit. Search for the line:

```
If FilePageSetup .LeftMargin =
dlg3.LeftMargin, .RightMargin
```

Delete `If` from the beginning of the line, choose File | Close, tell Word to save the changes to the macro, and choose File | Save All to save the changes to disk.

The macro is straightforward. Open the file you want to print in booklet format, then run the macro. You'll see a dialog box telling you that the macro will paste your text into a new document for booklet printing. Choose OK and you'll go to a second dialog box with three buttons: Change Paper Size, Set Document Margins, and Create Fold-Over Booklet.

The first button is equivalent to choosing File | Page Setup and then the Paper Size tab. The second is equivalent to choosing File | Page Setup and then the Margins tab. In most cases you can skip these steps, since the macro sets the page to landscape mode with appropriate margins. The last button tells the macro to create the new document. Once it's created, you can print the document on any printer by printing odd pages first, then turning the stack of paper over and printing even pages in reverse order. To set Word for even or odd pages, choose File | Print, and in the Print drop-down list choose Odd Pages or Even Pages. To print in reverse order, choose File | Print and then Options, and check the Reverse Print Order check box.—*M. David Stone*

SPREADSHEETS

Negative Time Values

Thank you for providing the tip "Working with Elapsed Time Values in Excel" (Ask Our Advisors, June 24, 1997).

Do you know of any way to deal with negative time values in a calculation? For example, if I am supposed to work 8 hours in a day and I work only 7, I have a balance of -1 hour. Microsoft recommended that I convert the result to a string with

```
=TEXT(ABS(A1-A2),"-h:mm:ss")
```

where (A1<A2). But I can't use the string in a subsequent calculation. Figure 1 illustrates the problem.

Also, is there a way to enter time into an equation other than using a cell reference? For example, I don't seem to be able to subtract 2:00 from 8:00 by writing =08:00-02:00. How can I do this?

Chris Sopcak
csopcak@Alaska.NET

PC MAGAZINE: Excel stores time values as fractions of a day, regardless of how it may display them. Thus what may appear on your screen as 6:00 A.M. is kept internally as a fraction, 0.25. Noon would be 0.5, 6:00 P.M. would be 0.75, and so on. Subtracting one time from another (or adding one to another) also results in a fraction. If the fraction is positive, Excel can display the result as a time value. If it is negative, Excel cannot. Thus, you can't subtract 9:00 from 8:00 and see the result as a time value. You can, however, convert the resulting fraction to a number of hours, simply by multiplying that result by 24. Thus, where you now have

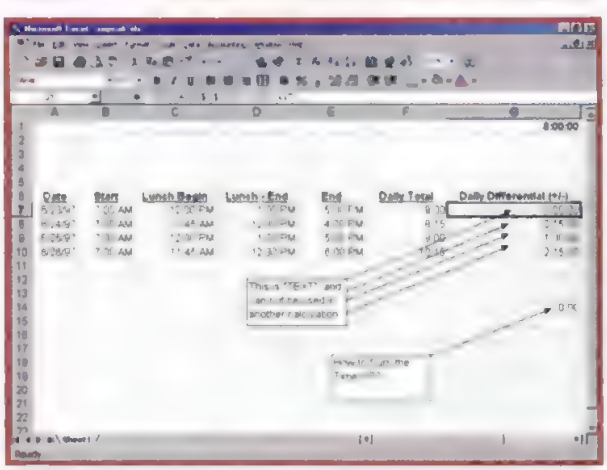


FIGURE 1: *When you convert negative time values to text in Excel, they're no longer usable in formulas.*

```
=TEXT(ABS($G$1-F7),"-h:mm:ss")
```

(in cell G7 of Figure 1), it would be simpler for you to write

```
=24*($G$1-F7)
```

The PC Zone

Your Source for

COMPAQ Armada 1530DM

- 133MHz Intel® Pentium® processor
- 16MB RAM
- 12.1" SVGA DS screen
- 1.4GB hard drive
- 10X CD-ROM drive

ONLY **$2499** Item #49330

Armada 1550DMT Item #47306 **$2999**
MMX133MHz/16MB RAM/1.4GB HD/10X CD-ROM/12.1" SVGA TFT

Armada 1580DMT Item #49329 **$3499**
MMX150MHz/16MB RAM/2.0GB HD/10X CD-ROM/12.1" SVGA TFT

IBM Business Partner
Authorized Personal Computer Dealer

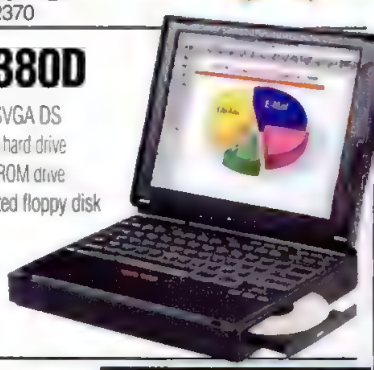
ThinkPad 560

- 133MHz Intel® Pentium® Processor
- 8MB RAM & 11.3" SVGA DS
- 2.1GB hard drive

LOWEST PRICE EVER!

ONLY **$1699** Item #42370

IBM ThinkPad 380D



- 150MHz Intel® Pentium® processor with MMX™ technology
- 16MB RAM
- 12.1" SVGA DS
- 2.1 GB hard drive
- 8X CD-ROM drive
- Integrated floppy disk

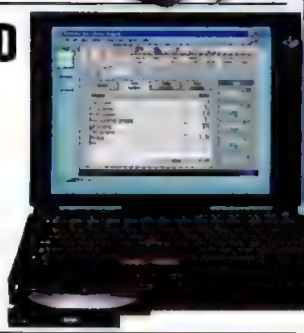
ONLY **$3279** Item #44905

COMPAQ Armada 7330T

- 150MHz Intel® Pentium® processor with MMX™ technology
- 16MB RAM
- 12.1" SVGA TFT
- 2.1GB hard drive

ONLY **$3799** Item #49360

IBM ThinkPad 760XD



- 166MHz Intel® Pentium® processor with MMX™ technology
- 32MB RAM
- 12.1" SVGA TFT
- 3.0GB hard drive
- 8X CD-ROM drive

ONLY **$4799** Item #42423

FUJITSU LifeBook 655TX

ONLY **$3999** Item #49328

- 150MHz Intel® Pentium® processor with MMX™ technology
- 16MB RAM & 12.1" SVGA TFT
- 2.0GB hard drive
- 16X CD-ROM drive
- 33.6 data/fax/voice Modem

LifeBook 535T Item #49319 **$2799**
MMX133MHz/16MB RAM/2.0GB HD/20X CD-ROM/33.6 d/v/f/12.1" SVGA TFT

IBM ThinkPad 770

DVD CAPABLE!

- 233MHz Intel® Pentium® processor with MMX™ technology
- 32MB RAM
- 14.1" SVGA TFT
- 5.1GB hard drive
- 10X CD-ROM drive
- 33.6 d/v/f Modem

NEW! ONLY **$6999** Item #45968

HITACHI VisionBook Plus 4140

- 133MHz Intel® Pentium® processor
- 16MB RAM & 12.1" HA- STN
- 1.4GB hard drive & 10X CD-ROM
- 33.6 data/fax/voice Modem

ONLY **$1799** Item #47362

VisionBook Plus 4360 Item #47364 **$3199**
MMX166MHz/16MB RAM/1.4GB HD/10X CD-ROM/33.6 d/v/f/12.1" SVGA TFT

More Great Buys from IBM

IBM ThinkPad 380 P150MHz/16MB RAM/1.08GB HD/12.1" SVGA DS	Item #44903	**$1699**
IBM ThinkPad 560E MMX150MHz/16MB RAM/2.1GB HD/11.3" SVGA TFT	Item #44959	**$2699**
IBM ThinkPad 560E MMX166MHz/16MB RAM/2.1GB HD/12.1" SVGA TFT	Item #44960	**$4249**
IBM ThinkPad 760E P150MHz/16MB RAM/2.1GB HD/12.1" SVGA TFT	Item #36738	**$3499**
IBM ThinkPad 770 MMX200MHz/32MB RAM/3.2GB HD/13.3" SVGA TFT	Item #45967	**$4899**

1-800-258-8088 **www.pczone.com**

Corporate, Education and Government bids welcome!
Fax your purchase orders to 1-425-430-3420

Credit cards are not charged until the order is shipped. Most products ship the same day (barring system failure, etc.) Shipping options include Ground, 2nd Day and Overnight delivery. Freight is based on average product weight. Handling extra. Insurance available. Special orders may require special shipping and handling charges. Please call for international shipping rates. Prices and product availability subject to change without notice. Specials and promotions may be limited to stock on hand. Not responsible for typographical errors. © 1997 Multiple Zones International, Inc. All rights reserved. Unauthorized duplication is a violation of applicable laws. Dana Commercial Credit Business Lease: 36-month, full-payout lease with $1 purchase option based on approved credit (1250 minimum lease amount). Other leasing options available. Administered by Dana Commercial Credit Corporation.

Notebook Values!

TOSHIBA

Satellite Pro 440CDX

- 133MHz Intel® Pentium® processor with MMX™ technology
- 16MB RAM, expandable to 144MB
- 1.34GB hard drive
- 10X CD-ROM drive
- 12.1" High Contrast Addressing Display
- Advanced 64-bit graphics acceleration
- Supports software playback of full-motion MPEG video with ZV technology

ONLY **$2399**
Item #44991

HOT!

FREE 56K Modem!

Satellite 220CDS

- 133MHz Pentium® processor
- 16MB RAM & 12.1" SVGA DS
- 1.34GB hard drive & 10X CD-ROM

ONLY **$1949**
Item #44989

Tecra 510CDT

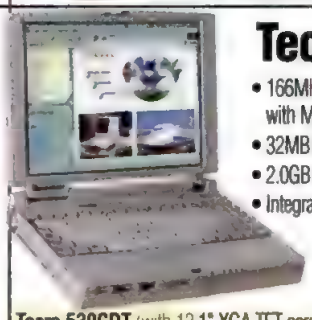
- 133MHz Intel® Pentium® processor
- 16MB RAM & 12.1" SVGA TFT
- 2.1GB hard drive & 10X CD-ROM
- 28.8 data/fax/voice Modem

ONLY **$2499***
*While supplies last. Item #38819

Satellite Pro 460CDT

- 166MHz Intel® Pentium® processor with MMX™ technology
- 32MB RAM & 12.1" SVGA TFT
- 2.0GB hard drive & 10X CD-ROM
- Integrated 33.6 data/fax/voice Modem

ONLY **$3749**
Item #44992



Tecra 520CDT

- 166MHz Intel® Pentium® processor with MMX™ technology
- 32MB RAM & 12.1" SVGA TFT
- 2.0GB hard drive & 10X CD-ROM
- Integrated 33.6 data/fax/voice Modem

ONLY **$4249**
Item #44993

Tecra 530CDT (with 12.1" XGA TFT screen) Item #44994 **$4649**

Portégé 300CDT

- 133MHz Pentium® processor
- 32MB RAM & 10.4" SVGA TFT
- 1.6GB hard drive
- Integrated 33.6 d/f/v modem
- Only 3.8 lbs.

ONLY **$3369**
Item #44996

Portégé 660CDT Item #38820 **$3949**
P150MHz/16MB RAM/1.2GB HD/10X CD-ROM/28.8 d/v/f/11.3" SVGA TFT

Tecra 740XCDT

- 166MHz Intel® Pentium® processor with MMX™ technology
- 16MB RAM
- 13.3" XGA TFT
- 3.0GB hard drive & 10X CD-ROM
- 28.8 data/fax/voice Modem

ONLY **$4499***
Item #44948
*While supplies last.

NO SURCHARGE on CREDIT CARDS

Circle 068 on your reader service card or go to WWW.PCMAG.COM/ProductLink

SOURCE CODE **PM710**

FREE CATALOG!

Call Today 1-800-258-8088

With over 20,000 products, we are the source for your computer hardware and software needs. Call us today!

The PC Zone

1-800-258-8088

A NASDAQ COMPANY Ticker Symbol: MZON

WE WILL TRY TO MATCH OR BEAT YOUR ADVERTISED PRICE. CALL FOR LATEST PRICING!!

WE ACCEPT PO'S FROM QUALIFIED FIRMS

30 DAY* MONEY BACK GUARANTEE

MEMORY

LIFETIME WARRANTY

SECURITY WILL CALL WINDOW NOW OPEN! NO SURCHARGE FOR MC, VISA AE & DISCOVER

HOT BOX SPECIALS

HP 4, 4P, 5P, 6P, 5MP – 2Meg	14.00
Panasonic Laser 6500 – 2Meg	14.00
HP Deskjet 1200C, LP – 2Meg	14.00
Lexmark Optra – 2Meg	14.00
1 x 9-80	9.00
1 x 9-70	12.00
1 x 3-70	6.00
1 x 9-60	12.00
Compaq Concerto – 8Meg	39.00
TI 5000, 5100, 5200 Base – 8Meg	29.00

Check our website for additional items not listed in our ad and order through our secure online form! www.4LATrade.com

72 PIN SIMMS (FPM, EDO)

	60NS	70NS	80NS
256 x 36	14.00	–	
512 x 36	19.00	–	
1MB x 32	32.00	–	
1MB x 36	32.00	–	
2MB x 32	57.00	57.00	57.00
2MB x 36	64.00	64.00	64.00
4MB x 32	79.00	79.00	79.00
4MB x 36	89.00	89.00	89.00
8MB x 32	159.00	159.00	159.00
8MB x 36	179.00	179.00	179.00
16MB x 32	319.00	319.00	319.00
16MB x 36	359.00	359.00	359.00
32MB x 32	639.00	639.00	639.00
32MB x 36	719.00	719.00	719.00
64MB x 32	1279.00	1279.00	1279.00
64MB x 36	1439.00	1439.00	1439.00
128MB x 32	2559.00	2559.00	2559.00
128MB x 36	2879.00	2879.00	2879.00

ECC SIMMS

Parities Pin 72 Pin (Install in pairs) / SIMMS	
1MB	20.00
4MB	79.00
16MB	319.00

SIMM MODULES (Add $5.00 for SIPP)

	60NS	70NS	80NS
256K x 32 (4 chips)	11.00	11.00	11.00
1MB x 32 (4 chips)	34.00	34.00	34.00
4MB x 32 (4 chips)	119.00	119.00	119.00
16MB x 32 (8 chips)	319.00	319.00	319.00

DIMMS (168 pin)

INDUSTRY STANDARD DIMMS	66Mhz	83Mhz	100Mhz	133Mhz
Unbuffered	168p 32Meg	64Mbit	128Mbit	256Mbit
3.3V ECC EDO	119	210	425/400	800
3.3V EDO	99	175	344	1231
5.0V EDO	99	175	344	1231
5.0V FPM	119	210	425/400	800
Buffered				
3.3V ECC EDO	119	224	425/400	800
3.3V ECC FPM	119	224	425/843	1825
5.0V ECC FPM	119	224	462	800
SDRAM (INDUSTRY STANDARD, DELL & GATEWAY				
3.3V SDRAM (2 stock)	66Meg			55.00
3.3V SDRAM	16Meg			64.00
3.3V SDRAM	32Meg			129.00
3.3V SDRAM	64Meg			259.00
3.3V SDRAM	128Meg			519.00
3.3V SDRAM	256Meg			1025.00
APPLE				
1 x 64	64Meg			60.00
2 x 64	128Meg			99.00
4 x 64	256Meg			169.00
8 x 64	512Meg			312.00
16 x 64	1GMeg			575.00
DELL OPTIPLEX, EXPRO 200				
3.3V ECC EDO	16Meg			119.00
3.3V ECC EDO	32Meg			249.00
3.3V ECC, EDO, 8/32chip	64Meg			479/945
3.3V ECC EDO	128Meg			1000.00
DELL POWEREDGE 2100& 4100				
3.3V ECC EDO	16Meg			119.00
3.3V	32Meg			249.00
3.3V 8/32 chip	64Meg			479/945
3.3V	128Meg			1000.00
3.3V	256Meg			2027.00
MOTOROLA (Apple Compatible)				
3.3V EDO	32Meg			69.00
3.3V EDO	64Meg			99.00
3.3V EDO	32Meg			175.00
3.3V EDO	64Meg			344.00

CACHE MEMORY

- 512K (IBM Part # 92G7326) – $50.00 works with PC750, PC750, Aptiva C+ Series
- 256K (160 pin) Pipeline Burst Cache Module $22.00 (Count Coin)
- 512K (160 pin) Pipeline Burst Cache Module $30.00 (Count Coin)
- 256K (168 pin) Aspen Cache Module – $50.00 compatible with IBM Aptiva ASN Series
- 256K (168pin) Aspen Cost Module – $30.00

Individual D-RAM Chips

FOR SIM & APPLE	4MB	8MB	16MB	32MB	64MB
1Meg x1	–	–	4.00	2.00	
1Meg x4	–	–	19.00	18.00	17.00
1Meg x4 (Zip Pk)	–	–	12.00	11.00	10.00
256x4 (Page Up)	–	–	7.25	6.75	6.50
256x4 (Page Zip)	–	–	9.25	9.00	8.95
256x4 (Video Zip)	–	–	–	10.95	9.95
256x36(SOJ)	–	–	12.00	11.00	–
256x16 SOJ	34.00	25.00	24.00	19.00	–
256x16 SOJ Edo	–	–	29.00	–	–
256x16 Video Zip	–	–	–	28.00	–

Make Your 486 Run like a Pentium

Kingston Turbo Chip – 3X Faster, for 486 Based Dell, Dx, Sx² Sx. ONLY $129.00

Dat performs Intel overdrive Pentium 83 UP TO 396% PERFORMANCE INCREASE!!

VIDEO MEMORY MODULES

Matrox Millennium	2Meg/4Meg/8Meg WRAM	89/159/229
Matrox Mystique	2Meg SGRAM	59
ATI 3D Pro Turbo	2Meg/4Meg	89/179
ATI Xclaim 3D	4Meg SGRAM	179
ATI 3D Xpression	2Meg SGRAM	79
Apple PowerMac 4400	2Meg/4Meg	89/139
NEC Powermate Pro 150, 220	2Meg/4Meg WRAM	129, 259
HP Vectra XV/6, VT/6, VA, XA	2Meg/4Meg WRAM	129, 259
Compaq 1Meg Video 213822-001	1Meg	129/259
Compaq Deskpro 2000 4000, 6000	2Meg/4Meg WRAM	129/259

Many More Please Call

GATEWAY MEMORY

Dest. Big Screen D5 - SDRAM	8Meg/16Meg/32Meg/64Meg	59/99/179/429
Dest. Big Screen D5 - EDO (pairs)	4Meg/8Meg/16Meg/32Meg	24/44/86/139
Destination P5, w/MMX - SDRAM	8Meg/16Meg/32Meg/64Meg	59/99/179/429
G5-166 200 Prof System - SDRAM	8Meg/16Meg/32Meg/64Meg	59/99/179/429
G5-166M 200M Millenia System – SDRAM	8Meg/16Meg/32Meg/64Meg	59/99/179/429
G6-200 Prof System - SDRAM	16Meg/32Meg	119/219
G6-Prof M Millenia System – EDO	4Meg/8Meg/16Meg/32Meg	24/44/86/139
Multimedia G-5 Systems – SDRAM	8Meg/16Meg/32Meg/64Meg	59/99/179/429
Prof. P-5 Series – Sdram	8Meg/16Meg/32Meg/64Meg	59/99/179/429

We Carry All GATEWAY Memory

NEC MEMORY

Ready 3010, 7010, 7020, 9010 9022 - Ready 9510 9520 9522 9530 9532 - Ready 7022 (EDO)
Image P60, P80, D, P100E
(Pairs) 4Meg/8Meg/16Meg/32Meg 24/42/69/130 — We Carry All NEC Memory

HEWLETT PACKARD MEMORY

Netserver 4/64,C 5/133LC (pairs)	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Netserver LE 4865X33 – 4860X266	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Netserver LH Plus 5/133, 5/166 (EDO, ECC)	16Meg/32Meg/64Meg/128Meg	119/229/499/999
Netserver 4/33LM - 5/100LM (pairs)	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Netserver 5/75LS – 5/133 LM (pairs)	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Pavilion 5010-7170 (pairs)	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Vectra 500 (EDO pairs)	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Vectra VA 6/180, 6/200 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Vectra VE2 5/75 - 5/133 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Vectra XA 6/180, 6/200 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	29/42/69/130
Vectra XM4 Series	4Meg/8Meg/16Meg/32Meg	29/42/69/130

We Carry Memory for ALL Models – Call

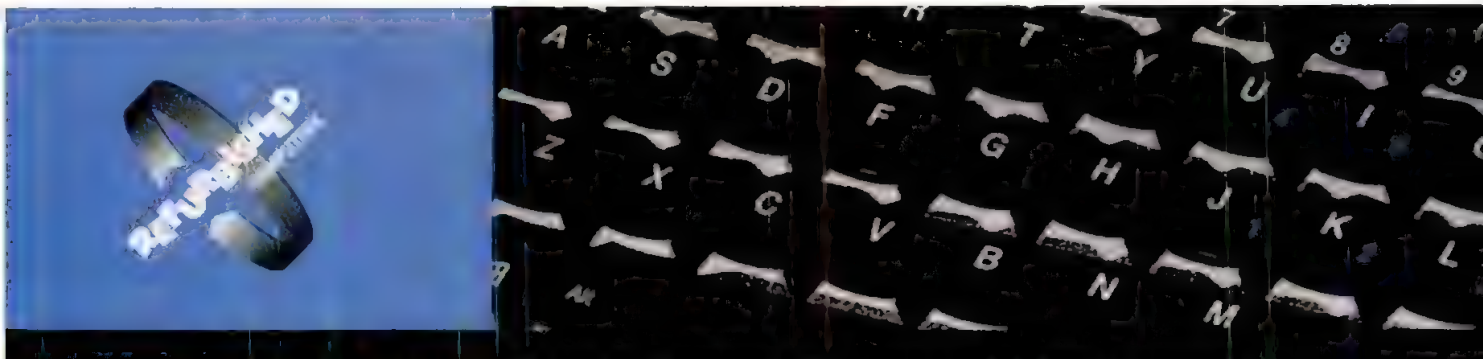
We also sell Memory for:
DEC, Sun, Zenith, Acer and Epson

NO SURCHARGE FOR MASTERCARD AMEX VISA OR DISCOVER PURCHASE ORDERS ACCEPTED FROM FORTUNE 2000, GOVERNMENT & INSTITUTIONS California orders add 8.25% sales tax. Returned orders or ordered wrong parts are subject to a 20% restocking fee. We accept international orders shipped via UPS Air APO FPO orders welcome Customers are responsible to pay customs and "other" charges if shipped Int'l. All credit card charges verified for fraudulent use SORRY NO REFUNDS AFTER 30 DAYS – EXCHANGES ONLY. If you receive defective merchandise we exchange only—no refunds. We accept MC, VISA, Discover AE, prepaid orders, purchase orders, wire transfer COD (cashiers check) orders, cash & cashiers checks. Orders shipped by UPS, REDX must be signed for
• ALL MANUFACTURER PART #'S ARE FOR REFERENCE ONLY • MINIMUM ORDER $40.00 • NO REFUNDS ON SHIPPING.

*certain restrictions apply. All prices final on date of sale.

IBM PS/1, PS/2 MEMORY MODULES

Aptiva 1 Meg (2 pairs)	4Meg	8Meg	16Meg	32Meg
Aptiva 2 Meg (2 pairs)	4Meg	8Meg	16Meg	32Meg
Aptiva 4 Meg (2 pairs)	4Meg	8Meg	16Meg	32Meg
Aptiva 8 Meg (2 pairs)	4Meg	8Meg	16Meg	32Meg
PC 13 Modem 6317 65/E	4Meg	8Meg	16Meg	32Meg
PC 13 Modem 6317 (EDO pairs)	4Meg	8Meg	16Meg	32Meg
PC 25 Modem 6495	4Meg	8Meg	16Meg	32Meg
PC 25 Modem 6495 (EDO pairs)	4Meg	8Meg	16Meg	32Meg
PC 35 Modem 6495	4Meg	8Meg	16Meg	32Meg
PC 35



HOW FAST DO THESE NOTEBOOKS AND DESKTOPS GO? IT DEPENDS ON HOW FAST YOU DIAL.

Forget everything you know about factory outlets. Well, almost everything. That's because at Dell Factory Outlet, you won't find damaged computers at skimpy markdowns.

And you won't find out-of-date technology. What you will find at Dell Factory Outlet are the award-winning lines of Dell® computer systems, completely refurbished and tested to meet our high standard of quality. Like notebooks featuring cutting-edge multimedia capabilities. And desktop systems featuring 266MHz Pentium® II processors. But here's the really big news. You can get all of this at incredible savings across the board.

Values so big, we call them **GIGABUYS!®** Inventories are limited to quantities in stock, and change regularly. So call us today. Don't miss out on your **GIGABUYS!**

REFURBISHED DELL OPTIPLEX DESKTOPS
200MHz PENTIUM® PRO PROCESSOR
STARTING AT **$1549**
Monitor Sold Separately

REFURBISHED DELL DIMENSION DESKTOPS
200MHz PENTIUM® II PROCESSOR
STARTING AT **$1939**
Monitor Sold Separately

REFURBISHED DELL LATITUDE NOTEBOOKS
166MHz PENTIUM® PROCESSOR WITH MMX™ TECHNOLOGY
STARTING AT **$2999**
Active Matrix Display

get a **GIGABUY!®**

TO ORDER, CALL TOLL FREE
888-274-4346
M-F 7AM-8PM, SAT. 9AM-5PM CST

CALL FOR CURRENT AVAILABILITY AND PRICING.
QUANTITIES LIMITED TO INVENTORY IN STOCK.

DELL®
FACTORY OUTLET

MMX intel inside pentium II processor

The Dell Factory Outlet sells only refurbished computers. For pricing on new Dell computers, call (800) 284-0008.

Available configurations may vary. For a copy of our limited warranties, please write to Dell Factory Outlet, 8801 Research Blvd., Austin, TX 78758, Attn: Warranties. See back of your invoice for additional warranty and return policy information. All sales FOB Austin. Sales receipts required for all returns/exchanges. Supplies limited to stock on hand. No rain checks. Prices and specifications subject to change without notice and valid in the U.S.A. only. All items are subject to Dell Factory Outlet's 14-Day Price Protection Policy. Dell, the Dell logo, Latitude, OptiPlex and Dell Dimension are registered trademarks, and "get a GIGABUY!" and GIGABUYS! are service marks of Dell Computer Corporation. Intel, the Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Dell disclaims proprietary interest in the marks and names of others. Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Quantities limited. ©1997 Dell Computer Corporation. All rights reserved. Printed in the U.S.A. Reproduction in any manner whatsoever without the written permission of Dell Computer Corporation is strictly forbidden. Dell cannot be responsible for errors in typography or photography. 5004

Once you've removed the time format that Excel will try to impose on this result (you can replace it with any numeric format), you will see a nice, simple –1. You can tally up a set of such results exactly as you would with any other kind of number.

To answer your other question: You can use

```
=24*(TIMEVALUE("8:00")-
TIMEVALUE("2:00"))
```

in order to subtract 2:00 from 8:00 directly in a formula.—*Craig Stinson*

DATABASES

Automating Batch Report Printing

I need to run a report once for each of the employees in my Employees table. Each report must be run separately, so I run the report for each employee manually, but doing this is very time-consuming. How can I batch-print all the reports?

JERRY BRANSFIELD
Chicago, Illinois

PC MAGAZINE: To automate the printing of reports, you can write a Visual Basic function to print a report once for each employee. Figure 2 shows an example using the Northwind sample database that comes with Microsoft Access. The `EmpReports()` function prints a modified version of the report Employee Sales By Country, called Employee Sales By Country, All Sales, once for each person in the Employees table. (I changed the report to reflect all sales and thus removed the two report parameters that requested a starting and an ending date. I also changed the source query to include `EmployeeID`.)

The code opens the Employees table in the current database and then goes through the table, one record at a time. At each employee record the code invokes the OpenReport method to print the report. Because the OpenReport method is passed a clause containing the employee ID for the current record, it restricts the report to just records for the current employee.

To use this code in your own database, first you'll have to type the code into a new module in your database. Select the Module tab and choose New. Then type in the code as it appears in Figure 2. You'll have to make changes to the code to reflect the names of your own objects. For example, replace Employee Sales By Country, All Sales in the OpenReport line with the name of your own report. If your employees table isn't named Employees or if its primary key isn't named EmployeeID, you'll need to change those names in the code too.

```
Option Compare Database
Option Explicit

Function EmpReports()
'************************************************************************
' Function EmpReports() - Procedure to run the Employees report. Runs
' the Report once for each employee in the Employees table.
'************************************************************************
Dim dbs As Database, rst As Recordset, strWhere As String
Set dbs = CurrentDb
On Error GoTo EmpReportsErr
Set rst = dbs.OpenRecordset("Employees", dbOpenTable, dbReadOnly)
Do Until rst.EOF
  strWhere = "[EmployeeID]=" & rst!EmployeeID
  DoCmd.OpenReport "Employee Sales By Country, All Dates", _
   acViewNormal, , strWhere
  rst.MoveNext
Loop
rst.Close
dbs.Close

EmpReportsExit:
 On Error Resume Next
 Exit Function
EmpReportsErr:
 MsgBox "Error " & Err & ": " & Err.Description, vbOKOnly, "Error!"
 Resume EmpReportsExit

End Function
```

FIGURE 2: *The function shown here automates the batch printing of employee reports by printing a report once for each person in the Employees table.*

Then select the File menu and choose Save. Name the module RunReports (or any name you like). Now, to create a macro to run the report, select the Macros tab and choose New. Enter RunCode for the Action and `EmpReports()` for the function name. Then select the File menu, choose Save, and call your macro Print Employee Reports. Now whenever you want to batch-print the reports, you can just run the macro.—*Sal Ricciardi*

Boxes in FoxPro Reports

When I print or preview reports in my FoxPro for Windows application, I frequently see black boxes instead of report objects. This seems to occur sporadically. Do you know what I'm doing wrong?

MICHAEL RIEMER
Berkeley, California

PC MAGAZINE: It's happened to me too. I believe it occurs only with executables built with the Distribution Kit in certain versions of FoxPro for Windows. The solution is to select those objects appearing or printing as black boxes, pull down the Object menu, choose Mode, and then choose Transparent instead of Opaque.

An object's fill color is shown only if the mode attribute is set to opaque. Therefore in those versions of FoxPro that apparently mistake the fill color for black on certain objects, changing the mode setting to transparent works around the problem.—*Sal Ricciardi*

HOW TO CONTACT US--!

Send your tips and questions to our advisors in any of the following ways:

E-MAIL *pctech@zd.com*

FAX 212-503-5799

MAIL Solutions, *PC Magazine*, One Park Ave., New York, NY 10016-5802 (Please send a floppy disk and a printout.)

COMPUSERVE To reach individual editors as listed on ZD Net, type GO PCMSTAFF.

If we print your tip, you'll receive $50 plus a *PC Magazine* T-shirt. We regret that we cannot answer letters individually.

CELEBRATE AS PCs COMPLEAT JOINS THE NEW COMPUSA DIRECT.

COMPUSA DIRECT

Superstore Savings Direct To You.

1-800-670-9549

www.compusa.com

FREE OFFERS INSIDE!

GRAND OPENING FREE

CALL WHILE SUPPLIES LAST.

THE NEW COMPUSA DIRECT

Advantage!

The service and experience of PCs Compleat combined with the selection, support and incredible buying power of CompUSA Direct. We offer more than 130 store locations nationwide for: hassle-free drop-off technical service, product returns and exchanges.

- Over 50,000 products
- Knowledgeable, helpful service
- Guaranteed low pricing
- Same day shipping for second day delivery on in-stock items
- Professional on-site installation available at reasonable prices
- Custom configuration
- Free software installation with system purchase
- Toll-free technical support for hardware and software
- Hassle-free drop-off technical service at over 130 CompUSA® Computer Superstores℠ locations nationwide
- On-site technical service available
- Technology Assurance Program™ support/repair coverage
- Computer and software training at CompUSA training facilities
- Flexible payment plans
- Money-back satisfaction guaranteed (Call for details)

NO PAYMENTS, NO INTEREST! FOR 6 MONTHS

On everything we sell. No minimum purchase. Must be paid in full within 6 months from date of purchase. Offer valid until the next issue of this magazine or 60 days, whichever comes first. No Payments/No Interest Financing Details. Subject to credit approval. Applies to purchases made with the CompUSA consumer credit card. Accrued finance charges will be assessed from the original date of purchase if balance is not paid in full within six months. As of July 25, 1997, The CompUSA credit card annual percentage rate (APR) is 22.30%. APR's vary; minimum monthly finance charge of 1™ may apply. Credit is provided by Beneficial National Bank USA.

THE NEW COMPUSA DIRECT

Superstore Savings Direct To You.

1-800-670-9549

www.compusa.com

FREE VCR & SCANNER

Purchase a desktop computer containing a 166MHz or faster Processor and get a FREE VCR and Scanner!

Limit 2 per customer. Product may differ slightly from photo.

or VISIONEER

FREE SCANNER

Purchase any desktop computer and get a FREE PC Compatible Scanner!

Limit 2 per customer.

FREE VCR & CARRYING CASE

MICRO™ CASE

Purchase any notebook computer containing a 166MHz or faster Processor and get a FREE VCR and Carrying Case!

Limit 2 per customer.

or

FREE CARRYING CASE

Purchase any notebook computer and get a FREE Carrying Case to help protect your investment!

FREE

Broderbund®

PrintShop Deluxe III!

Purchase any Canon, Epson, NEC or Okidata printer and get PrintShop Deluxe III FREE!

Limit 2 per customer.

FREE*

PowerCenter Deluxe!

	Price Before Rebate	30.00
Mail-In Rebate		-30.00*
	Price After Rebate	0.00

Limit 2 per customer.
*Free after Manufacturer Mail-In Rebate.

FREE*

Ergonomic Keyboard Drawer!

Improve your posture!

	Price Before Rebate	25.00
Mail-In Rebate		-25.00*
	Price After Rebate	0.00

Limit 2 per customer.
*Free after Manufacturer Mail-In Rebate.

FREE

Internal Modem!

When you purchase Microsoft Office 97 upgrade.

Four powerful applications to help manage information: Excel 97, Word 97, PowerPoint 97 and Outlook 97!

	Price Before Rebate	219.95
Mail-In Rebate		-40.00*
	Price After Rebate	179.95

Limit 2 per customer.
*Proof of ownership required.
021-00703

FREE*

3.5" DS/HD Diskettes, 50-Pack!

IBM-Preformatted.

	Price Before Rebate	15.00
Mail-In Rebate		-15.00*
	Price After Rebate	0.00

Limit 2 per customer.
*Free after Manufacturer Mail-In Rebate.

FREE*

Recordable CDs 2-Pack!

650MB of data or 74 minutes of audio.

	Price Before Rebate	10.00
Mail-In Rebate		-10.00*
	Price After Rebate	0.00

Limit 2 per customer.
*Free after Manufacturer Mail-In Rebate.

OFFERS AVAILABLE THROUGH MAIL ORDER AND THE INTERNET ONLY.

OFFERS & REBATES!

LIMITED TIME OFFER!

OFFERS AVAILABLE THROUGH MAI ORDER AND INTERNET ONLY.

TOSHIBA

Satellite 220 CDS

- 133MHz Pentium® Processor
- 1.4GB Hard Drive
- 16MB RAM
- 10X CD-ROM Drive
- 12.1" Dual-Scan Display

Price Before Rebate 1999.95
Instant Rebate -200.00
1799.95
Price After Rebate
PA1240U-52G

YOUR CHOICE $300 INSTANT REBATES

Packard Bell

PL1201S

- 166MHz Pentium® Processor with MMX™ Technology • 2.1GB Hard Drive • 32MB RAM • 16X CD-ROM Drive • 33.6/14.4 Data/Fax Modem

Monitor sold separately. While supplies last.

Price Before Rebate 1299.95
Instant Rebate -300.00
999.95
Price After Rebate
842941

IBM

LIMITED TIME OFFER!

ThinkPad 560

- 133MHz Pentium® Processor • 8MB RAM
- 2.1GB Hard Drive Plus CD
- 12.1" Active Matrix Display

Price Before Rebate 3899.95
Instant Rebate -300.00
3599.95
264020U
Price After Rebate
While supplies last

$200 INSTANT REBATE

NEC

Ready 9701SE

- 166MHz Pentium® Processor
- 2.1GB Hard Drive • 16MB RAM • **56K*/14.4 Data/Fax Modem** • 16X CD-ROM Drive • 16-Bit 3D Surround Sound with Software Wavetable
- 64-Bit PCI Accelerated Graphics

*56K modems are capable of downloads at 56Kbps, but speeds in actual use may vary

Monitor sold separately. While supplies last.

Price Before Rebate 1299.97
Instant Rebate -200.00
1099.97
Price After Rebate
102-00197

$100 INSTANT REBATES

COMPAQ

NEC

17" Monitor Remanufactured

- 15.8" Viewable Image Size
- 28 NI • 1280x1064
- 60Hz

Price Before Rebate 599.95
Instant Rebate -100.00
499.95
Price After Rebate
JC-1734VMA-FR3C

Presario 4122 Remanufactured

- 150MHz Pentium® Processor
- 2.5GB Hard Drive
- 16MB RAM
- 8X CD-ROM Drive
- 33.6/14.4 Data/Fax Modem

Monitor sold separately. While supplies last.

238200-003
Price Before Rebate 899.95
Instant Rebate -100.00
799.95
Price After Rebate

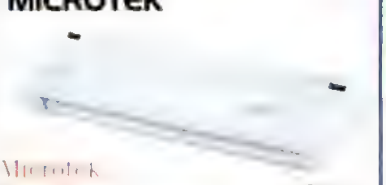
$50 INSTANT REBATES

Microsoft Office 97 Professional

Five powerful applications that work together and alike: Excel 97, Word 97, PowerPoint 97, Access 97 and Outlook 97

Price Before Rebate 539.95
Instant Rebate -50.00
489.95
Price After Rebate
353 00005

MICROTEK



Microtek Pag-Wiz Scanner

- Portable Scanner for Business or Home
- Up to 300dpi Resolution
- Contact Image Sensor
- Grayscale and Black and White Scanning Mode

Price Before Rebate 99.95
Instant Rebate -50.00
49.95
Price After Rebate
1108 90 300010

EPSON

Stylus 500 Inkjet Remanufactured Color Printer

- 720x720dpi Resolution
- 4ppm
- PC and Mac® Compatible

Price Before Rebate 199.95
Instant Rebate -50.00
149.95
Price After Rebate
C198011-FR

THE NEW COMPUSA DIRECT

GET THE COMPUSA ADVANTAGE WITH MORE THAN 130 STORES NATIONWIDE FOR TECHNICAL SUPPORT AND SERVICES!

1-800-670-9549
www.compusa.com

FREE VCR WITH PURCHASE OF ANY P166 OR GREATER COMPUTER!

PLUS 200.00 OFF ANY TOSHIBA NOTEBOOK COMPUTER!*

*Remanufactured and demos excluded

MMX intel inside pentium PROCESSOR

SAVE 200.00!

FREE EarthLink Internet Access! Purchase any desktop or notebook computer and get EarthLink FREE for 30 days! A 45.00 Value!

Satellite Pro 440CDT

TOSHIBA

Satellite Pro 440CDT

- 133MHz Pentium® Processor with MMX™ Technology
- 1.4GB Hard Drive • 16MB RAM
- 10X CD-ROM Drive
- 12.1" Active Matrix Display

Price Before Rebate 3199.95
Instant Rebate -200.00
2999.95
Price After Rebate
PA1241U-T2C

Toshiba 520CDT	Pentium® 166MMX™, 12.1" Active, 32MB, 2GB, 10X CD-ROM	PA1246U-T2A	4699.95-2008=4499.95
Toshiba 530CDT	Pentium® 166MMX™, 12.1" Active, 32MB, 2.1GB, 10X CD-ROM	PA1247U-T2A	5099.95-2008=4899.95

KIWI

intel inside pentium PROCESSOR

280C

ONLY 1999.95
280C

- 166MHz Pentium® Processor
- 1.44GB Hard Drive • 16MB DRAM
- 10X CD-ROM Drive • 11.3" Dual-Scan Display

Kiwi 780C P166MMX™, 12.1" Active Matrix Display, 64MB, 2.0GB 780C 3499.95

IBM

MMX intel inside pentium PROCESSOR

ThinkPad 560

ONLY 2799.95
264030U

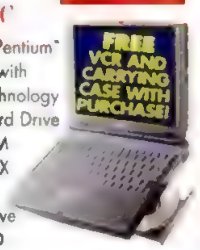
- 150MHz Pentium® Processor with MMX™ Technology • 2.1GB Hard Drive • 16MB RAM • 11.3" Dual-Scan Display

SONY

NEW!

PCG-707C

- 166MHz Pentium® Processor with MMX™ Technology
- 2.1GB Hard Drive
- 32MB RAM
- 14.5X MAX CD-ROM
- 12.1" Active Matrix LCD Display



MMX intel inside pentium PROCESSOR

ONLY 4499.95
PCG-707C

Sony PCG-705C Pentium® 150MMX™, 12.1" Active Matrix Display, 16MB, 2.1GB PCG-705C 3499.95

FREE SCANNER WITH THE PURCHASE OF ANY DESKTOP COMPUTER!

COMPAQ

Presario 2200

- 180MHz Processor with MediaGX
- 1.6GB Hard Drive
- 16MB RAM
- 8X CD-ROM Drive
- 33.6 Upgradable to 56K*
- Premier Sound Audio System

ONLY 799.95
292600-004
Monitor Sold Separately. While Supplies Last

*56K modems are capable of downloads at 56Kbps, but speeds in actual use may vary.

Presario 2200 with 14" Monitor 292600-004 KIT 999.95
14" V410 Monitor, 13.2" Viewable Image Size 285706-001 229.95

intel inside pentium PROCESSOR

Bravo MS-T Minitower Computer

AST

- 133MHz Pentium® Processor
- 2.0GB Hard Drive • 16MB RAM
- 192MB Max • 7 Drive Bays Total
- One-Year On-Site Warranty

Price Before Rebate 999.95
Instant Rebate -100.00
899.95
Price After Rebate
501956-401
Monitor Sold Separately. While Supplies Last

200MHz ONLY 999.95!

COMPAQ

Presario 4504

- 200MHz Pentium® Processor
- 2.1GB Hard Drive
- 16MB EDO RAM
- 16X CD-ROM Drive
- 33.6 Modem Upgradable to 56K*
- 64-Bit 3D Graphics
- 16-Bit Stereo Sound
- JBL Pro Speakers

intel inside pentium PROCESSOR

ONLY 999.95
304300-003
Monitor Sold Separately. While Supplies Last.

*56K modems are capable of downloads at 56Kbps, but speeds in actual use may vary.

HP Pavilion

intel inside pentium PROCESSOR

NEW LOW PRICE!

Pavilion 7410P

1499.95
Instant Rebate -200.00
1299.95

- 200MHz Pentium® Processor
- 2.1GB Hard Drive • 24MB RAM
- 16X CD-ROM Drive

Monitor Sold Separately. While Supplies Last. D5249A#ABA

digital

intel inside pentium PROCESSOR

NEW

Venturis FX5166

ONLY 1299.95
FR-AA5AW-JB
Monitor Sold Separately While Supplies Last.

- 166MHz Pentium® Processor
- 1.6GB Hard Drive
- 16MB RAM • 8X CD-ROM
- 16-Bit Stereo Sound

1-800-670-9549
www.compusa.com

GET THE COMPUSA ADVANTAGE WITH MORE THAN 130 STORES NATIONWIDE FOR TECHNICAL SUPPORT AND SERVICE.

COMPUSA DIRECT

GRAND OPENING VALUES!

OFFERS AVAILABLE THROUGH MAIL ORDER AND THE INTERNET ONLY FOR A LIMITED TIME!

Maxtor

1.6GB IDE Hard Drive

- 256K Cache Buffer
- Less Than 11ms Average Access Time
- 16.7MB/sec Data Transfer Rate

AVAILABLE THROUGH MAIL ORDER AND INTERNET ONLY

Price Before Rebate 149.95
-50.00*
99.95
K0181750A Price After Rebate

VAL

Recordable CD-ROM

- 6X Read
- 2X Write

Price Before Rebate 349.95
-50.00*
299.95
USA6WI-OR7 Price After Rebate

matrox

Millennium II

- The World's Fastest Professional Accelerator
- Optimized 64-bit PCI Graphics

279.95
MIL2P/4N
Millennium II, 8MB, PCI MIL2P/8M 399.95

UPGRADE YOUR MEMORY

16MB SIMM Memory Upgrade

4x32, 72pin Non-Parity

49.95
4X32

8MB Upgrade	72pin, Non-Parity	2X32	29.95
32MB Upgrade	72pin, Non-Parity	8X32	129.95

2967051V100

Microsoft Natural Keyboard

- Correctly Position Your Hands
- Work in Comfort

Price Before Rebate 69.95
Mfr. Mail-in Rebate -10.00*
59.95
Price After Rebate

Kodak digital science SOLUTIONS

8524399

Digital Camera DC-120

- Focus-free Lens
- Built-in Automatic Flash
- 3X Motorized Zoom Lens
- Resolution: 1280x960dpi

999.95
-200.00
799.95

SPOT

PageTak Color Scanner

- Optical Resolution 300x300dpi
- Scanning Resolution 4800dpi with Software Enhancement
- Sheet-fed Scanning Method

Price Before Rebate 149.95
-50.00
99.95
Price After Rebate

US Robotics

GREAT MODEM OFFERS!

Sportster 33.6/14.4 Data/Fax Modem

- Internal
- Upgradable to 56K
- 5-Year Warranty

001125-0
Price Before Rebate 69.95
-20.00*
49.95
Price After Rebate

Megahertz

XJ22888

28.8/14.4 Data/Fax PC Card Modem Remanufactured

149.95
-80.00
69.95

VAL

Shipped in promotional packaging.

CD-ROM Drives

- 16X CD-ROM Drive
- IDE Controller Included

Price Before Rebate 119.95
-40.00
79.95
Price After Rebate

20X CD-ROM Drive	USA20A-00W	99.95
24X CD-ROM Drive	USA24A-00W	119.95

NEC

100C

SuperScript 100C Color Inkjet Printer

- Black Print 600x300dpi at 3ppm
- Color Print 300x300dpi at 2-4ppm

Price Before Rebate 139.95
-20.00
Mfr. Mail-in Rebate -20.00*
99.95
Price After Rebate

HEWLETT PACKARD

C4568A#ABA

HP DeskJet 820Cse Color Inkjet Printer for Windows®

- Up to 6.5ppm Black, 4ppm Color
- 600x600dpi Black, 600x300dpi Color

Price Before Rebate 299.95
-50.00
249.95
Price After Rebate

HEWLETT PACKARD

Hewlett-Packard LaserJet 6Lse Printer

- 600x600dpi at 6ppm Black
- More than 128 Levels of Gray

399.95
C3994A#ABA

We'll beat any legitimate price in the current issue of this magazine on every product we sell. CompUSA Direct prices are available through mail order and the Internet and are valid until the next issue of this magazine, or 30 days from the date of this issue, whichever comes first. Our low price guarantee pertains to new, factory sealed products of the same brand and model number that are available and in stock at any local authorized retail store. Our guarantee does not apply to competitors' one-of-a-kind or other limited-quantity offers, special financing, installation, manufacturer's rebate, or when a bonus or free offer is included in the purchase. Some restrictions apply. Prices and specifications are subject to change without notice. We reserve the right to limit quantities. Any typographical, photographic or production error in products, pricing or offers is subject to correction. Due to manufacturers' restrictions, certain products may not be eligible for international shipment, and certain products may not be available at retail stores. Monitor displays are simulated. Pentium and the Intel Inside and Pentium Processor logos are registered trademarks and MMX is a trademark of the Intel Corporation. Windows is a registered trademark of Microsoft in the U.S. and other countries. Packard Bell is a registered trademark of Packard Bell Electronics, Inc. IBM is a registered trademark of International Business Machines Corporation, used under license therefrom. All trademarks are the property of their respective companies. Items other than software, returned within ten (10) days from the date of purchase with the original receipt or invoice, are eligible for refund or exchange. Unopened software may be returned within thirty (30) days for refund or exchange. Opened software may be returned for exchange only within ten (10) days from the date of purchase. A restocking fee will be charged on all returned items with missing boxes or packaging and returned printers with installed toner or inkjet cartridges. Refunds on purchases made with a credit card will only be credited to the same card. *In Connecticut only, instant rather than mail-in rebate. Superstore Savings Direct To You, CompPrice, The Low Price Period and America's Largest Computer Superstore are service marks of CompUSA Management Company. CompUSA and CompUSA Direct are registered trademarks of CompUSA Management Company. ©1997 CompUSA Management Company.

1-800-670-9549
www.compusa.com

INTERNATIONAL: 508-786-0600
OPEN 7AM-MIDNIGHT WEEKDAYS. 8AM-MIDNIGHT E.T. WEEKENDS AND HOLIDAYS.

THE NEW CompUSA DIRECT

Quality computing at a comfortable price.

Everex AGI Series

16MB EDO RAM

512K Cache
1.2GB EIDE Hard Drive
16X EIDE CD-ROM
3.5" Floppy Drive
2MB DRAM Graphics Accelerator
Sound Blaster™ Compatible Sound
12 Watt Speakers
Windows® 95
Microsoft® Software Bundle
Keyboard/Mouse
14" .28 SVGA Color Monitor

Intel 150MHz Pentium® processor	$1,099
Intel 200MHz Pentium® processor	$1,149

32MB EDO RAM

512K Cache
3.1GB EIDE Hard Drive
16X EIDE CD-ROM
3.5" Floppy Drive
2MB DRAM Graphics Accelerator
Sound Blaster™ Compatible Sound
12 Watt Speakers
Windows® 95
Microsoft® Software Bundle
Keyboard/Mouse
15" .28 SVGA Color Monitor

Intel 166MHz Pentium® processor **with MMX™ Technology**	$1,399
Intel 200MHz Pentium® processor **with MMX™ Technology**	$1,529
Intel 233MHz Pentium® processor **with MMX™ Technology**	$1,679

32MB EDO RAM

512K Cache
2GB **Ultra SCSI** Hard Drive
Adaptec SCSI Hard Drive Controller
12X SCSI CD-ROM
3.5" Floppy Drive
4MB SGRAM **Matrox Mystique** Graphics Card
Sound Blaster™ 32
12 Watt Speakers
Windows® 95
Microsoft® Software Bundle
Keyboard/Mouse

Intel 200MHz Pentium® processor **with MMX™ Technology**	$1,899
Intel 233MHz Pentium® processor **with MMX™ Technology**	$2,049

OPTIONS

- Matrox Graphic Cards
- Diamond Graphic Cards
- 56kbps Fax Modems
- 17" Color Monitors
- Networking
- MS Office Pro 97

intel inside pentium® PROCESSOR

EVEREX

MMX™ intel inside pentium® PROCESSOR

Copyright © reading at Incorporated. The information contained herein is subject to change without notice. Everex shall not be liable for technical or editorial errors or omissions contained herein. All other trademarks and registered trademarks are the property of their respective owners.

Everex StepNote™ Series

Everex StepNote 5

- Advanced heat-pipe cooling
- 256K L2 Cache
- Upgradable to 48MB EDO RAM
- 2MB DRAM PCI Video
- Zoom Video PCMCIA
- NTSC/PAL output (optional)
- 10X CD ROM
- Sound Blaster Pro Compatible
- Windows® 95
- Microsoft® Software Bundle
- 2 Year Warranty
- 48-Hour Hot-Swap

133MHz Intel Pentium® processor
12.1" DSTN Color
16MB EDO RAM
1.4GB HDD — **$1,849**

150MHz Intel Pentium® processor
12.1" DSTN Color
16MB EDO RAM
2.1GB HDD — **$2,019**

166MHz Intel Pentium® processor
with MMX™ Technology
12.1" DSTN Color
16MB EDO RAM
1.4GB HDD — **$2,199**

150MHz Intel Pentium® processor
12.1" TFT Color
16MB EDO RAM
1.4GB HDD — **$2,399**

150MHz Intel Pentium® processor
12.1" TFT Color
32MB EDO RAM
2.1GB HDD — **$2,799**

166MHz Intel Pentium® processor
with MMX™ Technology
12.1" TFT Color
32MB EDO RAM
2.1GB HDD — **$3,249**

Leapfrog Lab, Inc. is your discount computer source for quality computer products and user-friendliness.

As one of the industry's fastest growing direct resellers, we also offer a complete range of leading-edge peripherals from Creative Labs, Quantum, US Robotics, FIC and more.

Call for more information or visit our website at www.leapfroglab.com for a complete list of products and your chance to win free prizes!

Money Back Guarantee
24 Hour Toll-Free Tech Support:
1.800.262.3312
Optional Extended Warranties Available

1.800.532.7550
www.leapfroglab.com

LEAPFROG
Authorized Everex Reseller

Blowout Prices on Leading Products!

MicroWAREHOUSE

YOUR SOURCE FOR PC SOFTWARE,

COMPAQ

DeskPro 2000

Affordable and Manageable Desktop PC's

CP3378: 133MHz Pentium® 16MB, 1.2 GB, DT **$979**

CP5248: 166MHz Pentium® MMX 16MB 2.1GB HDD, DT **$1199**

CP5252: 200MHz Pentium® MMX 16MB 2.1GB HDD, DT **$1389**

Desk Pro 4000

Best Value for Network Environments

CP5259: 166MHz Pentium® MMX 16MB 2.4 GB HDD, DT **$1399**

CP5256: 200MHz Pentium® MMX 32MB 2.4GB HDD, DT **$1679**

CP5253: 233MHz Pentium® MMX 32MB 3.2GB HDD 16X CD-ROM, MT **$2129**

Desk Pro 6000

High Performance Network PC's

CP5022: 233MHz Pentium® II 32MB 2.1 GB SCSI HDD PDCD Drive, DT **$2629***

CP5024: 266MHz Pentium® II 32MB 4.2GB SCSI HDD 6X CD-ROM, DT **$3179***

*While supplies last!

IBM.

IBM Thinkpads

CP4775: 380, 150MHz Pentium®, 1.08GB, 16MB RAM, 12.1" DSTN **$1749**

CP4773: 380D, 150MHz Pentium®, 1.35GB, 16MB, 8X CD-ROM, 12.1" DSTN **$1999**

CP4774: 380D, 150MHz MMX Pentium®, 2.1GB, 16MB, 8X CD-ROM, 12.1" TFT **$3299**

CP2907: 760EL, 120MHz Pentium®, 1.08GB, 8MB/72MB, 12.1" SVGA TFT **$3199***

CP3558: 760E, 150MHz Pentium®, 2.1GB, 16MB/104MB, 12.1" XGA TFT **$3499**

CP3557: 760EL, 133MHz Pentium®, 2.1GB, 16MB/80MB, 12.1" SVGA TFT **$3829**

CP3559: 760ED, 133MHz Pentium®, 2.1GB, 16MB/104MB, 12.1" XGA TFT, 6X CD-ROM **$3699**

CP4434: 760XL, 166MMX Pentium® 2.1GB, 16MB, 12.1" TFT **$3829**

CP4433: 760XL, 166MMX Pentium® 2.1GB, 32MB, 12.1" TFT, WIN-NT **$3999**

CP4435: 760XD, 166MMX Pentium®, 3GB, 32MB, 8X CD, 12.1" XGA TFT **$4789**

*While supplies last!

TOSHIBA

Toshiba Laptops

CP5166: 220CDS, 133MHz Pentium®, 1.34GB HDD, 16MB RAM, 10X CD-ROM, 12.1" SVGA DSTN **$1949**

CP5205: 50CT, 75MHz Pentium®, 772MB, 6.1 TFT, 1.8lbs. **$1949**

CP5204: 300CT, 133MHz MMX, Pentium® 1.51GB HDD, 33.6 Kbps, 10.4" TFT **$3399**

CP5209: 440CDX, 133MHz MMX Pentium®, 1.34GB HDD, 10X CD, 12.1 FAST SCAN™ **$2399**

CP5210: 440CDT, 133MHz MMX Pentium® 1.34GB, HDD,12.1" TFT, 10X CD **$3299**

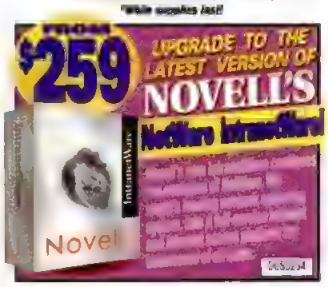
CP5208: 460CDT 166MHz MMX Pentium®, 2.02GB HDD, 10X CD, 33.6 Kbps, 12.1" TFT **$3799**

CP3217: 500CDT, 120MHz, 1.2GB HDD,12.1" SVGA TFT, 6X CD **$2399**

CP5206: 520CDT, 166MHz, 2.1GB HDD, 33.6, 12.1" TFT, 10X CD **$4290**

CP5207: 530CDT, 166MHz MMX Pentium®, 2.1GB HDD 33.6, 12.1" TFT, 10X CD **$4699**

- Visa and MasterCard accepted. Your credit card will not be charged until your order is shipped.
- Purchase orders subject to credit approval.
- All products covered by 30-day limited warranty. Defective software replaced immediately. Hardware replaced or repaired at our discretion.
- Connecticut, New Jersey, Illinois, Ohio, and Washington residents add applicable sales tax.
- Orders for in-stock items placed by 12:00 midnight (E) weekdays, (barring system failure, etc.) ship overnight by Airborne Express (Some areas require an extra day).
- We reserve the right to limit quantities.
- Shipping charge $9.95 per order up to 7 lbs. $1.25 per lb. above 7 lbs.
- UPS ground service also available at current UPS rates plus $2.95 handling charge per order except COD. UPS orders placed by 3:00 p.m. (E) weekdays, ship same day.
- Actual freight charges apply for computers, hard disks, Bernoulli's, tape backups, monitors, and printers.
- Alaska, Hawaii, outside continental U.S., APO/FPO call for information.
- Item availability and price subject to change without notice.
- Some products not available outside U.S. Please call for more information.
- Not responsible for errors or omissions.



FHOUSE

HARDWARE AND PERIPHERALS

FREE! JAVA TUTORIAL

COMPAQ ARMADA 4110

- 100MHz Pentium® Processor
- 8MB RAM
- 810MB Removable Hard Drive
- Windows 95
- 11.3" SVGA DSTN Color Display
- 16-Bit Stereo Sound
- Lithium Ion Battery
- 3 Year Warranty

Ask For Item # CP3226

ONLY $999

VISIONBOOK PLUS 4140

New!

ONLY $1799

- 133MHz Pentium® Processor
- 1.4GB HDD
- 16MB RAM
- 12.1" HA-STN display
- 10X CD-ROM
- 33.6 Kbps Modem

HITACHI CP5239

IBM THINKPAD 765D

IBM New!

- 166MHz MMX Pentium® Processor
- 32MB RAM
- 3GB Hard Drive
- 256KB Cache
- 13.3" XGA TFT color display
- 8X CD-ROM

ONLY $6699

CP5040

TOSHIBA SATELLITE 220CDS

ONLY $1949

- 133MHz Pentium® processor
- 1.34GB hard disk drive
- 16MB EDO RAM
- 10X CD-ROM drive
- 12.1" SVGA DSTN display

CP5166 TOSHIBA

Storage Warehouse

IDE Hard Drives Starting at $179.95

SEAGATE HARD DRIVES (IDE)

DR5652 ST31276A, 1275MB	$179.95
DR5767 ST32132A, 2113MB	$199.95
DR5655 ST52520A, 2560MB	$219.95
DR6333 ST33240A, 3240MB	$249.95
DR6331 ST36450A, 6450MB	$479.95

WESTERN DIGITAL HARD DRIVES (IDE)

DR6112 Caviar 11200, 1.2GB	$179.95
DR5594 Caviar 21600, 1.6GB	$189.95
DR5595 Caviar 22100, 2.1GB	$209.95
DR5359 Caviar 33100, 3.1GB	$259.95
DR5972 Caviar 34000 4.0GB	$339.95

IBM HARD DRIVES (IDE)

DR5732 Deskstar, 2.1GB	$239.95
DR5731 Deskstar 3.24GB	$279.95

QUANTUM HARD DRIVES (IDE)

DR6544 Fireball ST 3162OST 1.6GB	$219.95
DR6543 Fireball ST 3216OST, 2.1GB	$239.95
DR6542 Fireball ST 3324OST, 3.2GB	$299.95
DR6541 Fireball ST 3432OST, 4.3GB	$369.95
DR6524 Fireball ST 3648OST 6.4GB	$669.95

MAXTOR HARD DRIVES (IDE)

DR6069 Maxtor K0182500A, 2.5GB	$199.95*
DR5661 Maxtor K0183500A, 3.5GB	$249.95*
DR6390 Maxtor K0184300A, 4.3GB	$299.95*
DR5880 Maxtor K0185120A, 5.1GB	$349.95*
DR6557 Maxtor K0187000A, 7.0GB	$449.95*

*Price reflects $30 manufacturer's mail in rebate direct from Maxtor. Ask for rebate certificate AA0818. Rebate expires 10/31/97

MICROPOLIS HARD DRIVES (SCSI)

DR6091 4345NS, 4.55GB	$[illegible]
DR6089 4345WS	$[illegible]
DR6088 3391NS, 9.1GB	$[illegible]
DR6093 3391WS	$[illegible]

QUANTUM HARD DRIVES (SCSI)

DR652* Fireball ST 3216OST 2.1GB	$319.95
DR6526 Fireball ST 3324OST, 3.2GB	$399.95
DR6523 Fireball ST 3420ST, 4.3GB	$529.95
DR6524 Fireball ST 3648OST, 6.4GB	$669.95

SEAGATE HARD DRIVES (SCSI)

DR6713 ST32272N 2.26GB	$549.95
DR6589 ST32272W, 2.26GB	$629.95
DR5639 ST34371N, 4.35GB	$749.95
DR5635 ST34371W 4.35GB	$799.95
DR5641 ST19171N, 9.1GB	$1329.95
DR5637 ST19171W 9.1GB	$1399.95

WESTERN DIGITAL HARD DRIVES(SCSI)

DR6103 W/D Enterprise 2.17GB	$499.95
DR6106 W/D Enterprise 4 36GB	$759.95

IOMEGA DITTO TAPE DRIVES

DR5402 Ditto 2GB Int., 2GB	$119.95
DR5401 Ditto 2GB Ext., 2GB	$169.95

IOMEGA JAZ DRIVE

DR4840 Internal 1GB	$299.95
DR1119 External 1GB	$399.95
ME6478 1 0GB Jaz Disk	$124.95*

*Quantity pricing available

IOMEGA ZIP DRIVE

DR4602 Parallel Port	$149.95
DR1050 SCSI	$149.95
DR5279 Insider SCSI	$149.95
ME6387 100MB Diskette	$17.95

PINNACLE MICRO CD-R DRIVES

DR5513 RCD 4x4 Internal	$739.00
DR5512 RCD 4x4 External	$839.00

HP/COLORADO TAPE DRIVES

DR5623 T3000 Int., 8GB	$169.95
DR5624 T4000ES Ext., 8GB	$479.95

SEAGATE TAPE DRIVES

DR4709 TapeStor 800 Int., 800MB	$99.95**
DR5707 TapeStor 800 Ext., 800MB	$129.95
DR4769 TapeStor 3200 Int., 3200MB	$179.95**
DR5708 TapeStor 3200 Ext., 3200MB	$199.95
DR5180 TapeStor 8000 Int. SCSI 8GB	$369.95**
DR5182 TapeStor 8000 Ext. SCSI 8GB	$459.95**
DR5181 TapeStor 8000 Int. IDE, 8GB	$369.95**

**Includes cartridge

SEAGATE MEDALIST™

3.2 GB IDE HARD DRIVE

ONLY $249.95!

DR6333 Seagate

IOMEGA JAZ DRIVE

INTERNAL DRIVE ONLY

$299.95!

DR4840

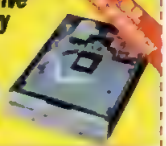
HEWLETT PACKARD DESKJET 855CXi PRINTER

ONLY $289.95* BLOWOUT!

- PC/Mac Compatible
- Up to 7ppm black
- 600dpi black

PR12411

LS-120 Diskette Drive from O.R. Technology



ONLY $99.95!*

BN4343

SPORTSTER 56K MODEM

INTERNAL FOR ONLY

$147.99*

U.S. Robotics

BND2130

External $167.99 BND2131

CREATIVE PC-DVD

- Watch theater-style video
- Retrieve up to 7 times more data than standard CD-ROM
- Includes MPEG card
- Listen to hi-fi audio

$499.99!

DR6307

D-200L DIGITAL CAMERA

OLYMPUS

ONLY $599!

INP0979

Free Catalog Subscription

Check the appropriate box(es) to receive a free, one-year subscription and mail this coupon to:
1720 Oak Street, P.O. Box 3014, Lakewood, N.J. 08701-3014

Name:

Address: E-Mail:

City: State: Zip:

○ MicroWAREHOUSE ○ MicroSYSTEMS WAREHOUSE

○ MacWAREHOUSE ○ Data Comm WAREHOUSE™

(Expect to receive your next issue within 4-6 weeks).

©Copyright 1997 MicroWarehouse, Inc. MacWAREHOUSE® is a division of MicroWarehouse, Inc. MacWAREHOUSE® and MicroWarehouse® are registered servicemarks of MicroWarehouse, Inc.

PPM7

To order, call toll-free 24 hours a day, 7 days a week

1-800-378-9081

On the Internet: www.warehouse.com

Fax: 908-905-5245

Order until 12:00 midnight (E) weekdays for overnight delivery of "in stock" items — only $9.95!*

*Shipping charge $9.95 per order up to 7 lbs., $1.25 per lb. over 7lbs.

CALL FOR A FREE CATALOG!

CIRCLE 003 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

PC Connection

7 Time Award Winner! PC WORLD Best Mail-Order Company!

Order as late as 3 a.m. ET and still get Overnight Delivery!

FAX US AT: 603-446-7791

Get the Best for Less!

UPGRADE!

NEW VERSION! Illustrator 7.0
FREE! Pocket Kick-n-Sketch!
Upgrade Only $94.95
46275

Microsoft Windows NT Server 4.0 5-Client Access License
Upgrade Only $349.95
35871

Corel WordPerfect Suite 8
NEW VERSION! Win/NT
Upgrade Only $134.95
48795

Visual SourceSafe 5.0
Protects your Web and development projects!
FREE after rebate!
Call for qualifying details!
35873

Epson Stylus Color 600 Inkjet Printer

COLOR!

Breakthrough 1440 x 720 dpi

4ppm photo-quality color!
6ppm black & white!

Only $299
37819

37817 Stylus Color 800..... $449
(8ppm black, 7ppm color, optional int. Ethernet & LocalTalk)

EXCLUSIVE Money-Saving Deal!

100MB Zip Drive & PaperPort Deluxe

19171 - Zip Drive
44022 - PaperPort Deluxe Software

SAVE $50!

Buy Both Only $199.90*
*After mail-in rebate

PAPERPORT DELUXE
VISIONEER

Buy VivoActive Producer 2.0 and get Microsoft FrontPage 97 FREE! A $139.95 value!

Only $599.95*
*After $100 mail-in rebate from Vivo

Microsoft
42614

Peripherals!

New! High-Speed Memtek 24X CD-ROM
High Speed 24X Drive!
The Fastest Yet!
Only $119.95
43363

PalmPilot Professional & ACT! 3.0
SAVE $50!
Keep up-to-date and in touch!
Maximize your productivity!
$499.95
43520

Sony DSC-F1 Digital Still Camera
$150 Price Drop!
Now Only $699
37680
- Stores up to 108 pictures at 640 x 480 resolution!
- Built-in flash, exposure control!
- Macro mode for close-ups!

56Kbps Sportster Modem
U.S. Robotics
The Intelligent Choice in Information Access
The Fastest Ever!
ONLY $149.95*
(*after $50 rebate — Expires 10/4/97)
37315

NEW! Internet Mouse!
Complete with 5-year warranty & toll-free tech support!
Makes surfing the Web faster & easier!
Only $49.95
43175

HP LaserJet 6Lse Printer
Includes LaserJet Internet Publishing Kit with software from Microsoft & HP on CD-ROM!
$399
40621

Western Digital Caviar Internal 4GB IDE Hard Drive
Award Winning!
36271
$329.95

OptiQuest 17" Monitor
NEW LOW PRICE!
ONLY $499
39387
ViewSonic
- .28mm dot pitch
- Up to 1280 x 1024 resolution @ 61MHz

SyQuest SyJet External SCSI Drive
32594
Double your capacity! Buy any SyJet drive now and get an extra 1.5GB FREE! $125 value.
$499
Award Winning!
PC COMPUTING EDITORS' CHOICE

UMAX Astra 6005 Flatbed Scanner
PRICE DROP!
Only $169.95
- 300 x 600 dpi
- Scans legal size documents
- FREE software included!
39394

Capture faster, smoother video images with Connectix Color QuickCam... Then use Embellish to give your Web graphics excitement & impact!
Bundle Only $219.95
43371

OUR POLICY • MOST MAJOR BRANDS, AMERICAN EXPRESS, and NOVUS cards. No surcharges. • Most products are covered by manufacturer's warranty against defects for at least 30 days from the invoice date. • All returns require prior authorization; please call for an RMA. • We are not responsible for typographical errors. • Pricing and promotions are subject to change without notice. Continental U.S.: Shipping Charges: $6 per order up to 10 pounds. On orders weighing 10 pounds or more, shipping is $1 per pound. Please call for weight/shipping charge information. Some items may require additional days to deliver via a freight carrier. Please check with your sales rep for more details. Evening events beyond our control, all credit card orders placed in overnights by 3 a.m. ET will ship Airborne Express for delivery the next business day. Saturday delivery available to many areas upon request at no additional charge. Order all day Saturday thru noon Sunday for Monday delivery. Some areas require an extra day delivery. APO/FPO, International orders and Hawaii, Alaska, Canada, Puerto Rico & U.S. Virgin Islands: Shipping and rates explained now and operator. All other areas: Call 800-800-4444 or FAX 603-446-7701 M-F 8 a.m.-8 p.m. ET. ©1997 CC Connection, Inc. - NYSE: PCC. PC Connection & the person silhouette are registered trademarks of CC Connection, Inc.

digital Business Desktops

Venturis FX2 5166

- 166MHz
- 16MB RAM
- 1.2GB HD

Only $998

monitor sold separately

44206

COMPAQ Deskpro 2000 5166X/2100

Now with MMX®!

NEW!

PLUS:

- 2.1GB Smart EIDE HD
- 16MB SDRAM (384MB Max)
- 256K Cache (512K Max)
- S3 Trio 64V2/GS Video w/1MB SGRAM (2MB Max)
- 3-year warranty

Only $1199

monitor sold separately

42757

Call Us First!

THE BEST PRICES ON PC SYSTEMS!

800-800-CPUs

HITACHI MOBILIZED COMPUTING

Full Multimedia Machine!

VisionBook 4140

42339

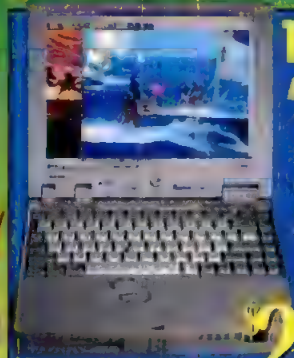
Only $1799

- 133MHz MMx
- 16MB RAM
- 1.4GB HD
- 12.1" HA-STN Screen
- 10X CD-ROM
- 33.6Kbps Modem

SAVE ask about... LEASING OPTIONS for BUSINESS CALL FOR DETAILS

NEW! Extended Service Plan

Supplement the mfr.'s warranty for 4 full years from date of purchase!



Tecra 500CDT Notebook!

Light in Weight, Long on Performance! Flexible! Expandable!

- 120 MHz Pentium®
- 16MB RAM (expandable to 144MB)
- 12.1" Active Display
- 1.2GB Hard Drive
- 6X CD-ROM
- Integrated 28.8 Kbps voice/fax/modem
- 3-Year Warranty

Only $2099

16MB RAM FREE!

while supplies last

TOSHIBA

Software!

Business		
43103	ClarisWorks Office for PC	$79
27667	FileMaker Pro 3.0 Tradeup, Upgrade	99
44059	ClarisWorks 4.0 Internet Ed w/FREE Myst	94.95
42228	BusinessBasics	34.95
37596	PTS Photoshop 4.0 Training (Begin, Int, Adv)	79.95*
40794	Corel WordPerfect Suite 8 Win95 * After rebate	294.95
Utilities		
32853	Norton Utilities Win 95	74.95
31822	Norton AntiVirus Win 95	69.95
35300	Partition Magic 3.0 CD	49.95*
40879	CyberAngel	79.95
34905	Cybermedia's First Aid 97	34.95
26134	Dr Solomon Anti Virus Tool Kit * After $15 rebate	64.95
Games		
40862	Dark Reign	49.95
40505	Aaron vs Ruth	39.95
32103	STARFLEET ACADEMY	49.95
33248	X-Wing vs. TIE Fighter	49.95
Graphics & Design		
43130	NetObjects Fusion 2.0 - NEW LOW PRICE	294.95
39399	PhotoTools 1.1	94.95
41518	Flightcheck for Win	379.95
43162	Adobe Illustrator 7.0 w/FREE PTS Tutorial & CD	369.95

Peripherals!

CD-ROM		
38323	Hi-Val 12X Internal IDE	$99.95
43092	Smart & Friendly 2006 Plus Internal CD-R	395
41380	Pinnacle Micro RCDW226 Internal Rewriteable CD-R Drive	699
Printers/Scanners		
43463	HP DeskJet 1000Cse Printer	499
40623	HP LaserJet 6Pse Printer	799
40619	HP LaserJet 5se Printer	1049
41479	UMAX PageOffice II C Sheetfed Scanner	179.95
41775	Microtek ScanMaker V 300 Flatbed Scanner	149
39628	Linotype-Hell Jade Flatbed Scanner	499
Storage		
19172	Zip 100 Parallel Port	149.95
19171	Zip 100 SCSI	149.95
19072	Zip 100 10-pack media	129.95
23616	Jaz 1GB SCSI External	399.95
32556	Jaz 1GB Disks - 3 pack	299.95
Video		
37869	IX Micro Turbo TV	99
40169	Diamond Monster 3D	199.95
39615	Matrox Rainbow Runner	249.95
37778	Magnavox MB7000 17" Monitor	399
43817	NEC MultiSync E700 Monitor	699
43960	ViewSonic OptiQuest V95 19" Monitor	1049
36253	Agfa ephoto Digital Camera	299.95
41600	Nikon Coolpix 100 Digital Camera	699
37680	Sony DSC-F1 Digital Camera	699

SUPER LOW SIMMS!

1MB SIMMS as low as $9.95 13020

4MB	8MB	16MB	32MB
as low as $24.95	as low as $49.95	as low as $99.95	as low as $189.95

Nuts & Bolts

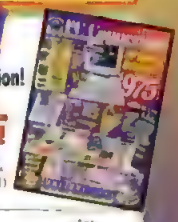
The Only Fully Integrated Utilities Suite for Win 3.1 and Win 95!

Only $39.95*

*$10 Rebate

39592

FREE! Catalog Subscription! CALL TODAY!



Mention source code 107PCM1

Name

Address Apt

City State Zip

10,000 HOT PRODUCTS 24 HRS A DAY!

888-800-4535

www.pcconnection.com

Now shop on-line with a name you can trust!

PC AD 107PCM1

MIDWEST COMPUTER WORKS

Where Corporate America Shops!

Best Buy

✓ Knowledgeable Sales Staff ✓ Fast Delivery ✓ Quality Top Name Brands ✓ Technical Support

OVER 80,000 PRODUCTS SHIPPED AT LOWEST PRICES!

YOUR COMPLETE COMPUTER SOURCE!

NEW Lightweight Notebooks!

TOSHIBA
Portege 300CT
- MMX Pentium® 133MHz
- 12MB EDO RAM exp. 64, 1.6GB HDD
- Full Duplex Speakerphone Weighs 3.8 lbs.

$3359

Only 3.8 lbs!

TOSHIBA
Libretto 50CT Mini-Notebook
- 6.1" TFT Display 800x48[illegible] Resolution
- 75MHz Pentium 16MB EDO RAM exp. 32MB
- 722MB IDE HD External 3.5" Type II PC Card
- Graphics Controller with 1MB EDO DRAM
- SoundBlaster Pro Audio Lithium Battery
- Preinstalled Software: Windows 95, Puma Transit, Microsoft Internet Explorer, Toshiba Utilities and Accessories, Hypertext Online Documentation, and Runtime Video for Windows

FULL-FUNCTION WINDOWS 95 MINI-NOTEBOOK!

$1949

Only 1.85 lbs!

TOSHIBA
Satellite Pro 440CDT
- MMX Pentium® 133MHz
- 12.1" TFT (800x600)
- 16MB exp. 144 / 1.4GB HD, 10xCD
- 33.6 Kbps voice/data/fax Modem
- Lithium Battery, 256 L2 Cache
- 3 Yr. Warranty, 16 bit Audio

MMX *Zoomed Video Support!*

Lease It! **$111** a month

$2919

New & Improved Toshiba Releases!

Satellite 220CDS - 12.1" DS P-133 16MB 1.4GB 10X $1899

Tecra 740CDT - 13.3" TFT, P-166MMX 16MB 3.0GB 120X 33.6 $6249

SHARP
PC-9800T
- Pentium® MMX 166MHz Processor
- 12.1" TFT Display (1024x768 Res.)
- 32MB EDO RAM, 4MB VRAM
- Removable 6.4GB HD
- Removable 10X CD ROM Drive
- 16 bit Sound
- Type II or III PC Card Slot
- IrDA Infrared Communication
- 33.6Kbps Voice Fax Modem
- 3 Yr. Parts Later Warranty
- 1 yr. Sharp Fast Instant Exchange Warranty

1 Year INSTANT SHARPFAST Exchange Warranty!

$3999

MMX

THE NOTEBOOKS YOU WANT AT THE PRICES YOU NEED!

U.S. Robotics
56Kbps

56Kbps x2 XJACK PC CARD MODEM (XJ1560)

$229

- x2 Technology for up to 56K download capability
- Built-in Megahertz XJACK connector
- Internet Ready
- Fax/Modem Protection
- Automatic Answering Machine Features
- Surge Line Guard for power protection
- FREE Data & Fax Software

LEXMARK
Optra R+ Laser Printer
- Maximum 1200dpi Laser Resolution
- Upgrade to 4MB, 8MB, 16MB, 32MB, 64MB
- Network capability, High Speed Parallel Connection
- Postscript Level 2 and PCL 5 Emulations
- Preinstalled 39 PS 2 Scalable Fonts
- 200 Sheet Paper Tray
- 1 Year Warranty

BEST SELLING NETWORK PRINTER!!

Call for pricing on the complete quality line of Lexmark laser and inkjet printers.

$992

HEWLETT PACKARD

HP OmniBook 5700CTX
- MMX Pentium 166MHz
- 12.1" TFT Display, 1024x768
- 32MB EDO RAM, 6.4GB HD
- 24X CD-ROM Accelerator
- SoundBlaster Pro Wavetable Sound
- 4hr Lithium Battery Life
- 3 Year Warranty

$4799

HP LaserJet 6Lxi Laser Printer
- 600dpi Resolution, 6 PPM
- 150 Sheet Multipurpose Paper Tray
- 1MB RAM, Expandable to 34MB
- Parallel, SIMM Slot
- 500 Sheet Maximum Paper Tray
- Preinstalled 35 Font Cartridge

$385

We carry the full line of HP products. Call today for discount pricing!

Attention Server Users
Limited Time Only
Special! Call Now.
HP Vectra 320 Server
$998
32MB RAM, 4GB HD, Windows 95 and more. Call for details!

Lease a HP Notebook Starting at $59 a Month!!

BEST BUY
$479

ADI America
MicroScan 5V 17" Display
- 17" (16" Viewable) Flat Square Tube, Enhanced Contrast Display
- 1280x1024 @ 60Hz Resolution
- .28 Trinitron Finish, Anti-glare
- Dark Inner Coating
- Multiple Video Bandwidth
- Front Panel Controls
- Energy Compliant

BLOWOUT **$159**

UMAX
Astra 600S Scanner
- 300x600 dpi
- Parallel Plug-and-Play Interface Software
- 1 Lamp, Cold Cathode Lamp Technology
- SCSI II Interface

Graphics for Professionals!

APC
Back-UPS Office
- 350 VA, 210 Watt
- $25,000 Guarantee

WE CARRY THE FULL APC POWER PROTECTION LINE!

$169

- Full-time Surge Suppression
- Side-wiring Protection
- Internet Ready
- Fax/Modem Protection
- 10 Minute Battery Backup

YOUR APC HEADQUARTERS!

U.S. Robotics
56Kbps modem

Sportster 56K Ext. Faxmodem

Sportster 56K allows Internet/Online users to download information from x2-capable service providers at up to 56Kbps while uploading information (like web addresses) at up to 33.6 Kbps.
- x2 Technology for up to 56Kbps Internet download capability, plus 28.8 and 33.6 Kbps send and receive
- Fax V.17 Group III 14,400 & 9600bps send/receive fax
- Maximum Throughput of 115Kbps with compression
- Automatically selects x2 or V.34/33.6Kbps
- Universal compatibility down to 300bps

$169*

*After Mail-in $50 Rebate

NOTEBOOKS: ACER, AMS, AST, COMPAQ, CTX, DPS, FUJITSU, HEWLETT PACKARD, HITACHI, IBM, SAMSUNG, SHARP, SONY, TOSHIBA, ALL MODELS IN STOCK

DESKTOPS: POWER PROTECTION, SCANNERS, HEWLETT PACKARD, MICROTEK, POLAROID FILM SCANNERS, UMAX, MONITORS, ADI, ELO, MAG INNOVISION, MAGNAVOX, MITSUBISHI, NEC, NOKIA, PHILIPS, SONY, VIEWSONIC, VISIONMASTER by IIYAMA, MULTIMEDIA

COMPONENTS: MOTHERBOARDS, PROCESSORS, MODEMS, U.S. ROBOTICS, VIDEO BOARDS, PRINTERS, EPSON, FARGO, HEWLETT PACKARD, DRIVES, CD-ROM DRIVES, CD RECORDABLE, HARD DRIVES, LEXMARK, OKIDATA, PANASONIC, OMS, CONTROLLERS

SYSTEMS: AST, Bravo MS P 166MMX 2G 32M 14X 32M, Bravo LC 6/150 Pentium 2 256 2.0G 32M, COMPAQ, HEWLETT PACKARD, IBM, SERVERS, AST Servers, COMPAQ Servers, HEWLETT PACKARD Servers, IBM Servers, LEXMARK, SONY, TOSHIBA

Where Corporate America Shops!

Easy Payment Methods!

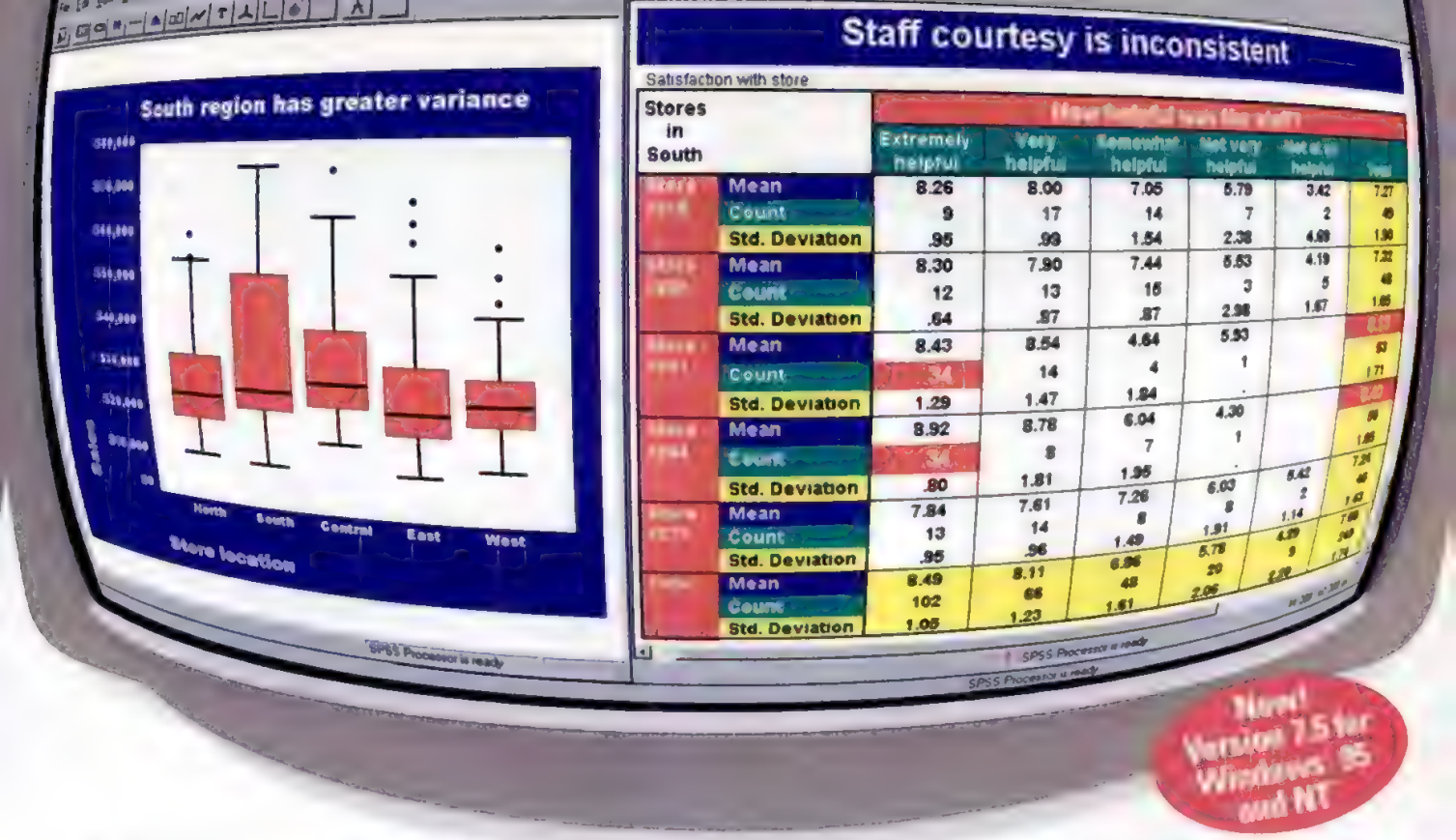
Office Hours Monday-Friday 8am-7pm CST
24-HOUR FAX 847-367-6540
International Line 847-367-6519

VISA

Policy Information

800-85-WORKS

VISIT US ON THE WEB! 96757

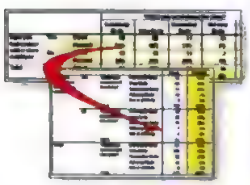


New! Version 7.5 for Windows 95 and NT

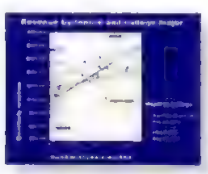
Unleash the power in your data

SPSS mines your data in ways no spreadsheet or reporting tool can

Go beyond spreadsheets with analytical techniques such as crosstabs, regression, factor and over 100 others.



Use SPSS' multidimensional pivot tables to discover critical information that might be buried in traditional reports.



Get the best picture of your data with over 60 high-resolution business, professional and quality charts.

The critical information you need, like the variance and distribution of your data, isn't in simple summary reports. To compete and win, you need to take the next step – advanced analysis that leads to better decisions. Use powerful statistical methods and revealing charts to spot patterns and trends. Discover what's significant. Make better forecasts. You don't have to be a statistician to use SPSS. SPSS assists you with a tutorial, step-by-step instructions and "What's this?" help. We help you find a solution with a range of training and analytical consulting services. See our Web site for a white paper on how statistics help you achieve a competitive advantage.

SPSS is used today to:

- Analyze your database
- Accurately forecast sales
- Increase customer satisfaction
- Find the most profitable segments
- Improve mailing responses

"Users will want this program for when their spreadsheets run out of steam." – PC Magazine

"...fast, powerful, robust, and a joy to use." – Windows Sources

"...easy enough for statistics newcomers, but includes features that power users require." – PC World

"...an essential tool" – PC Week

SPSS
Real Stats. Real Easy.™

For more information

Call 1 (800) 543-5833 A5833

or fax 1 (800) 841-0064
Visit our site on the World Wide Web: http://www.spss.com
or e-mail: sales@spss.com

We speak your language with 26 offices and 60 distributors worldwide

A Handful Of Reasons To Buy The New Backpack® Bantam™ CD-ROM Drive.

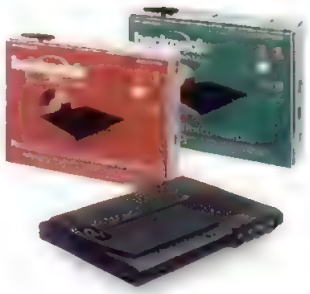
Multi-media capabilities. CD-ROM and Windows™ sound in one package (also available without sound).

It's the smallest, the fastest, and the best-looking, lightweight parallel port CD-ROM drive available—and it fits in the palm of your hand. It's the new backpack bantam CD-ROM drive with integral Windows™ stereo sound. You'll tote it anywhere. Everywhere. Installation is a breeze. Simply plug this handy little drive into the printer port of any IBM-compatible pc or notebook. Use it with Windows (95, 3.X, NT*), DOS*, and OS/2*. What about your printer? The bantam has smart printer pass-through. It's a lot to put in one sleek package, but we did it.

One cable connection puts port•ability in your hands. Cool!

A travel light CD-ROM solution.

Free CASE LOGIC® carrying case with purchase. A $32.95 suggested retail value. (Limited Time Offer)



backpack® bantam™

MicroSolutions

The port•*ability* leader.

Ph: 800-293-1214 (US and Canada)
or 815-756-3411, Fax: 815-756-2928
Internet: www.micro-solutions.com

FamilyPC Rating ★★★★

*Sound not supported under DOS, NT, or OS/2

CDW - 800.736.4239 • Global Computer Supplies - 800.845.6225 • Inmac - 800.547.5444 • Micro Warehouse - 800.367.7080 • Midwest Micro - 800.413.9856
PC Connection, Inc. - 800.800.5555 • PCs Compleat, Inc. - 800.514.4727 • PC Zone - 800.258.2088 • Quill - 800.789.0606 • USA Flex - 800.872.3539

CIRCLE 855 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

WINNER OF 34 BEST BUY AWARDS — SINCE 1984 — WINNER OF 34 BEST BUY AWARDS

USA FLEX

The Best Prices on Over 20,000 Computer Products

Toshiba Satellite 220CDS

- 166MHz Pentium® Processor
- 16MB RAM
- 1.34GB HDD
- 10X CD-ROM
- 12.1" SVGA DSTN Color Display

Only $1949

TOSHIBA

CP5166

HP LaserJet 6Lse Printer

HEWLETT PACKARD

NEW!

- 4ppm
- 600dpi black laser printing

$399.95

PR12310

US Robotics x2™ 56K Modem

Robotics

Internal Model BND2130
External Model BND2131

$147.99*

$167.99**

*Price reflects mfr's $50 rebate. Expires 10/4/97

Microsoft Office 97 Standard

As low as $179.95

Price reflects Microsoft $60 mail-in rebate. Price before rebate is $219.95.

SU2442

Iomega Zip Drive

Only $149.95

- Small, light and portable
- Stores 100MB on each 3.5" disk

OR4602 Parallel OR1050; SCSI ORS278; Insider

MONITORS/GRAPHICS CARDS

14"

Power User (13.2 VIS) MT1828 $199.00
Viewsonic Optiquest V641 (13.2 VIS) MT1803 $209.00
PRINCETON E040 (13.4 VIS) MT1517 $219.00
Philips/Magnavox MB4010 (13.2 VIS) MT1379 $239.00

15"

PRINCETON E050 (13.8 VIS) MT1516 $289.00
Viewsonic Optiquest V655 (13.8 VIS) MT1806 $299.00
Viewsonic E655 (13.8 VIS) MT1811 $319.00
NEC E500 (13.8 VIS) MT1547 $389.00

17"

Power User (15.9 VIS) MT1178 $469.00
PRINCETON E070 (15.8 VIS) MT1514 $499.00
Viewsonic G771 (16 VIS) MT1517 $599.00

MAG DX700T (16 VIS) MON0512 $649.00
SONY 200SX (15.9 VIS) MON0415 $699.00

19"

PRINCETON E090 (18 VIS) MT1573 $869
HITACHI 751 (18 VIS) MT1488 $1,149.00

20"

Viewsonic Optiquest Q100 (18.4 VIS) MT1445 $1,049
SAMSUNG 20GLS (18.7 VIS) MT1542 $1,250
SONY 300SF (19 VIS) MON0418 $1,699.00

21"

ADI 6G (20 VIS) MT1693 $1,299.00
HITACHI PRO 800 (20 VIS) MT1535 $1,399
Viewsonic PT813 (20 VIS) MT1455 $1,569.00
SAMSUNG 21GLS (19.7" VIS) MT1543 $1,649

*Monitor size refers to CRT/visible image.

HERCULES

T2312EDO Terminator 3D PCI, 2MB $99.00
T2314EDO Terminator 3D PCI, 4MB $129.00
T2212EDO Terminator 64 PCI, 2MB $79.00

PLAY

Snappy Video Capture $189.00

ATI

Video Xpression+ 2MB $99.00
3D Xpression+ PCI TV, 2MB $139.00
3D Pro Turbo PCI TV, 4MB $199.00

CREATIVE LABS

GBWA302 Graphics Blaster MA302 $79.00
GBWA334 Graphics Blaster MA334 $99.00

PC CARDS

MEGAHERTZ

56K x2 with XJack DMD2771 $239.00
33.6 with XJack Cellular capable DMD2299 $229.00
33.6 Modem 10Base-T with XJack DMD2519 $269.00
10Base-T with XJack (X) 10BT/DECT63 $109.00
10Base-T (cc 10 BT) DEC1357 $109.00

PRACTICAL PERIPHERALS

Internal 56K x2 DMD2416 $145.00
Internal 56K K56Flex DMD2537 $145.00
External 56K x2 DMD2415 $195.00
External 56k K56Flex DMD2538 $195.00

HAYES

Accura 33.6 External DMD2440 $119.00
Hayes 56k K56Flex External DMD2526 $169.00
Hayes 56k K56Flex Internal DMD2525 $139.00

BOCA

Boca M56 (External) K56flex DMD2472 $165.00
Boca M56 (Internal) K56Flex DMD2471 $145.00

US ROBOTICS

Sportster 33.6 Internal BND2138 $89.00
Sportster 33.6 External BND2139 $119.00
Sportster 56K Internal BND2130 $147.00
Sportster x2 56K External BND2131 $167.00
Courier V. Everything Internal DMD1649 $229.00
Courier V. Everything External DMD1650 $249.00

* Price reflects mfr's $50 mail in rebate offer valid 7/1/97 - 12/31/97.
** Price reflects mfr's $20 mail in rebate offer valid 8/3/97 - 12/31/97.

MULTIMEDIA/CD-ROM

CREATIVE LABS

Blaster CD 24X EX7967 $149.00
Sound Blaster AWE64 Gold EX7684 $199.00
Sound Blaster AWE64 Value EX7814 $99.00
Sound Blaster 16 Basic EX7961 $69.00
Creative PC-DVD DR6307 $499.00

PINNACLE MICRO

4X4 CD-Writer Internal DR5513 $739
4X4 CD-Writer External DR5512 $839

PANASONIC

Portable 4X CD-ROM Drive DR4853 $299.00
Portable 4X CD-ROM Drive with Sound Card and Speakers DR4940 $399.00
Portable 8X CD-ROM Drive DR5651 $399.00
24X CD-ROM Atapi EIDE Internal Drive DR6620 $179.00
24X CD-ROM SCSI Int Drive DR6619 $219.00

PHILIPS

2X/6X CD-EasyWriter Internal DR5746 $499.00

2X/6X CD-EasyWriter External

DR5747 $549.00
8X CD-ROM Drive Internal DR5208 $199.00
8X CD-ROM Drive External DR5429 $299.00

HP SUPERSTORE

HP CD-Writer 2X/6X Internal DR6042 $379.00
HP CD-Writer 2X/6X External Parallel DR6041 $479.00
HP CD-Writer 2X/6X External SCSI DR6043 $479.00

PRINTERS...LASER/INK JET/DOT MATRIX

HP PRINTERS

DeskJet 340C PR11812 $299.00
DeskJet 672C PR12302 $199.00
DeskJet 694C PR12125 $299.00
DeskJet 820Cse PR11480 $299.00
DeskJet 870Cse PR11792 $399.00
DeskJet 1600C PR11886 $349.00
LaserJet 5se PR12268 $1049.00
LaserJet 6Lse PR12310 $399.00
LaserJet 6Pse PR12301 $799.00
LaserJet 6MP PR09975 $999.00
OfficeJet 570 color 4-in-1 PR12303 $599.00

EPSON

DFX 5000+/8000 PR11695/PR11694 $1579.00/$2499.00
Stylus Color 400 PR12121 $199.00
Stylus Color 600 PR12126 $299.00
Stylus Color 800 PR12127 $449.00
Stylus 1520 PR12430 $799.00
Stylus Color 3000 (PC) PR12407 $1999.00
Stylus Color Photo PR12380 $499.00

BROTHER

HL-720 (Windows Only) PR11689 $299.00
HL-730DX (Windows & DOS) PR11752 $329.00
HL-760 (1200X600) PR12043 $399.00
HL-1060 (6ppm) PR12042 $699.00
MFC-690 (thermal) PR11488 $269.00
MFC-1950+ (ribbon) PR11487 $399.00
MFC-4550 (laser) PR11715 $799.00
MFC-6550MC (laser) PR11716 $999.00

OKIDATA PRINTERS

OkiPage 4W (Windows Only) PR11702 $199.00
OL600e PR11418 $299.00
ML320 PR11771 $319.00
ML321 Turbo PR11772 $459.00
ML590 PR11802 $439.00
ML591 PR11803 $589.00

CANON

BJC-240 PR11764 $169.00
BJC-4200 PR11763 $199.00
BJC-4550 (up to 11x17) PR11766 $499.00
BJC-620 PR11765 $299.00
C2500 (Fax, Scan, Print, Copy) PR11712 $499.00

LEXMARK

Color Jetprinter 2050 PR11929 $199.00
2380/2381 Plus Dot Matrix Printer PR12326/PR12329 $319.00/$429.00
2390/2391 Plus Dot Matrix Printer PR12330/PR12325 $369.00/$469.00
#079 Plus PR11318 $269.00
#039 10 Plus PR11256 $399.00
Optra R Plus PR11421 $999.00
Optra Lx+/Optra Lxn+ PR11422/PR11699 $1599.00/$1999.00
Optra C PR11423 $4299.00
Optra S 1250 12ppm PR12345 $1089.00
Optra S 2450 24ppm PR12340 $2179.00
Optra N-240/Optra N-245 w/16MB RAM PR11698/PR11697 $2799.00/$3299.00

NEC

SuperScript 860 (laser) PR11494 $399.00

While supplies last!

DESKTOP SYSTEMS

IBM 300GL SERIES

P200 32MB Open Bay NVHDX CP5046 $1219
P166MMX 16MB 2.5GB WIN95 CP5035 $1199
P200 32MB 2.5GB WIN95 CP5034 $1299
P200MMX 16MB 2.5GB 16X CD-ROM WIN95 CP5033 $1599

Full Line of IBM Monitors Available!

NEW COMPAQ DESKPRO SERIES

DeskPro 2000 DT P166MMX 16MB 2.1GB CP5248 $1199
DeskPro 2000 MT P166MMX 32MB 3.2GB 16X CD CP5244 $1619
DeskPro 2000 DT P200MMX 16MB 2.1GB CP5252 $1389
DeskPro 2000 MT P200MMX 32MB 3.2GB 16X CD CP5247 $1769
DeskPro 4000 DT P166MMX 16MB 2.1GB CP5259 $1399
DeskPro 4000 DT P200MMX 32MB 2.1GB CP5256 $1679
DeskPro 4000 DT P233MMX 32MB 3.2GB 16X CD CP5253 $2129

Compaq HP models do not include monitor unless otherwise stated.

USA FLEX MINITOWER SYSTEMS w/512K CACHE

Flex Special 6x86-PR200 16MB 2.0GB (AMD-5D) 16X CD CP5413 $999
Flex Performer 6x86-PR200 32MB 2.0GB 4MB/3D 20X CD CP5414 $1399
Flex UltraPerformer 6x86-PR233 32MB 4.0GB 4MB WRAM 20X CD CP5415 $1849
CyberNet2 15" Monitor & Printer P-200MMX 32MB 2.0GB 2MB/3D, 20X CD BN4349 $1999
Basic Workstation & 17" Monitor P-166 32MB 2.0GB 1MB/3D Rage, 16X CD BN4348 $1199
Business Workstation & 17" Monitor P-200MMX 32MB 4.0GB 2MB/3D Rage, 20X CD BN4347 $1899

HEWLETT-PACKARD VECTRA VL SERIES PC

VL5-DT-166MMX DT P166MMX 16MB 1.6GB 256KB CP5212 $1199
VL5-DT-200MMX DT 200MMX 32MB 2.5GB 256KB 8X CD CP5224 $1629
VL5-MT-166MMX DT P166MMX 16MB 2.5GB 512KB CP5225 $1299
VL5 MT-200MMX DT 200MMX 32MB 2.5GB 512KB 8X CD CP5227 $1729

DIGITAL IMAGING

SONY

NEW! Digital Mavica MVC-FD5 Camera IN6346 $399
DSC-F1 Digital Zoom Camera IN6191 $699.00

KODAK

DC20 Digital Camera INP0890 $199.00
DC50 Digital Zoom Camera INP0647 $699.00
DC120 Digital Zoom Camera INP1132 $999.00

VIVITAR

ViviCam 2000 Digital Camera IN6357 $229

ViviCam 3000 Digital Camera IN6359 $399

MICROTEK

Scanmaker E3 Flatbed Scanner IN5573 $199.00
Scanmaker E6 Flatbed Scanner IN5593 $329.00
Scanmaker E6 Pro Flatbed Scanner IN5594 $529.00

UMAX

Astra 600P Flatbed Scanner IN6253 $199.00
Astra 600S Flatbed Scanner INP1145 $199.00
MDX 8000 Digital Camera IN6251 $479.00

IBM LAPTOP 380D

IBM.

- 166MHz Pentium Processor
- 16MB RAM
- 1.6GB HDD
- 24X CD-ROM
- 12.1" SVGA DSTN Color Display
- 33.6 Fax/Data Modem

$1999

HEWLETT PACKARD PALMTOP 320LX

$659

320LX + Palmtop Connectivity Pack

$469

COMPAQ DESKPRO 2000

- Intel Pentium 166MHz w/MMX
- 32MB RAM
- 2.1GB HDD
- 24X CD-ROM

$1199

IN5248

Monitor not included

EPSON Stylus Color Photo

NEW!

- 6 Color Printing

$499.95

PR12391

NOTEBOOK COMPUTERS

TOSHIBA

Satellite 220CDS P133 12.1" DSTN 1.4GB CP5166 $1949
Libretto 50CT P75 6.1" TFT 720MB CP5205 $1949
Satellite Pro 440CDX P133MMX 12.1" DSTN 1.3GB CP5209 $2399
Satellite Pro 440CDT P133MMX 12.1" TFT 1.3GB CP5210 $3299
Satellite Pro 460CDT P166MMX 12.1" TFT 2.0GB CP5208 $3799
Tecra 520CDT P166MMX 12.1" TFT 2.1GB CP5206 $4299
Tecra 530CDT P166MMX 12.1" XGATFN 2.1GB CP5207 $4699
Portege 400CT P133MMX 10.4" TFT 1.3GB CP5204 $3399

HITACHI Vision Book Series

P166 1.6GB 16MB 10X 12.1" DSTN CP5239 $1799
P166MMX 1.6GB 16MB 10X 12.1" DSTN CP5240 $2499
P166MMX 2.1GB 16MB 10X 13.6 12.1" TFT CP5241 $3499

HEWLETT-PACKARD Omnibook 5700

5700CT P150 MMX 2GB 12.1" TFT CP4505 $4299
5700CTX P166 MMX 4GB 12.1" TFT CP4506 $5199

IBM ThinkPad

380 P150 1.08GB 16MB 12.1" DSTN CP4775 $1749
380D P150 1.35GB 16MB 8X 12.1" DSTN CP4773 $1999
380D P150MMX 2.1GB 16MB 8X 12.1" TFT CP4771 $3299
560 P100 810MB 8MB 11.3" DSTN BN4410 $1499
560 P133 2.1GB 8MB 11.3" DSTN CP4220 $1899
760XD P166MMX 3GB 32MB 8X 12.1 XGA TFT CP4435 $4789

ACER

610CD P150 1.4GB 16MB 10X CD, 11.3" DSTN CP4934 $1799
610CDT P150 1.4GB 16MB 10X CD, 11.3" TFT CP4933 $2399

COMPAQ Armada Series

1150 P150MMX, 1.6GB 16MB 10X, 21.1" CSTN CP5293 $2499
1160T P166MMX, 2.0GB 16MB 10X, 12.1" CTFT CP5294 $3499
1530DM P133MMX, 1.4GB, 16MB, 33.6 10X, 12.1" CSTN CP5292 $2899
1580DMT P150MMX, 2.1GB, 16MB, 33.6, 10X, 21.1" CTFT CP5295 $3699

TARGUS

INSTANT $20 off this Targus leather bag with purchase of any notebook computer

USA FLEX

171 Brighton Drive • Bloomingdale, IL 60108
Phone: 630-894-0345 • Fax: 630-351-7204
6AM-11PM(CT) Mon-Fri • 9AM-4PM(CT) Sat & Sun

Code # PM104

Please reference this code when ordering

Airborne Express Delivery Service Available

1-800-766-1940

www.USAFLEX.com

THE ULTIMATE SOURCE FOR COMPUTER PRODUCTS!

First SOURCE International
The Only Source for Computer Hardware & Software

STANDARD MEMORY - SIMMS & DIMMS

30-PIN SIMMS

1x3-70 (3-chip/1MB).... $9
1x9-70 (9-chip/1MB).... $14
4x3-70 (3-chip/4MB).... $19
4x9-70 (9-chip/4MB).... $23

72-PIN SIMMS (EDO)

1x32-60 (4MB) $17
2x32-60 (8MB) $32
4x32-60 (16MB) $63
8x32-60 (32MB) $122
*Install in Pairs for Pentium Systems

72-PIN SIMMS (Parity)

1x36-70 (4MB) $25
2x36-70 (8MB) $49
4x36-70 (16MB) $79
8x36-70 (32MB) $169

168-PIN DIMMS (SDRAM)

2x64 (16MB) $89
4x64 (32MB) $179

DESKTOP MEMORY

Apple

PowerMac 8500, 8600, 9500, 9600
16MB M3789G/A $79
32MB n/a $149
64MB n/a $279

AST

Bravo LP, MT, LC III & LC III, Prosonic MT & LT & Advantage! Models
16MB 500987-004 ..... $99
32MB 500987-005 ..... $169
Bravo LC & MS Pentium Models
16MB** 503008-002 ..... $99
32MB** 503008-003 ..... $169

DELL

Power Desktop 486 Models
16MB 310-3625 ..... $89
PowerEdge XE, OptiPlex, Dimension XPS, OmniPlex ME 486 & Performance M/L/T Models
8MB 310-6083 ..... $99
16MB 310-3327 ..... $99
32MB n/a $149
Performance ME, OmniPlex Pentium ME, OptiPlex XXGX, PowerEdge SP/XE/ES
16MB 310-3336 ..... $99
32MB 310-3337 ..... $159
64MB n/a $259
PowerLine Workstations XE & DE Models
16MB 310-3469 ..... $69
32MB 310-3630 ..... $109
Dimension XPS & OptiPlex XL/ME/GMT Pentium Models
16MB 310-3374 ..... $99
32MB 310-3375 ..... $149

digital

DECpc MTE, LP & MT Models
16MB PB/PC3M4B $89
Station & Venture Models
8MB PB/PCMM4B $59
16MB PB/PCMM4C $89
32MB PB/PCMM4D $149

HEWLETT PACKARD

Netserver & Vectra VE2 Models
8MB D2975A $79
16MB D5579A $89
32MB D2298A $149
Vectra XU/XM3/XM2/XM2/VE2/VE3/VE, Multimedia PC & Pavilion Models
8MB D2591A $55
16MB n/a $89
32MB n/a $149
Vectra 486 XM4/5/U/T/N/M/VM/VL
8MB D2132A $59
16MB D5579A $89

IBM

Aptiva (all models) & PC 300 Model 330/350
8MB 92G7541 ..... $49
16MB 92G7543 ..... $89
32MB 92G7545 ..... $149
16MB Video 92G7460 ..... $89
256K Cache 92G7251 ..... $79
ValuePoint 6384/6472/6482/6484/6492 /6494/6381 SI Models
8MB 92G0130 ..... $59
16MB 92G0160 ..... $89
32MB 92G0320 ..... $149
PS/ValuePoint 6384, PS/1 Consultant/Essential/Expert Models
16MB 96P9291 ..... $99
PS/ValuePoint 6382/6384/6387 PS/1 Advisor/Consultant/Essential/Expert/Willow/Investor Models
8MB 64S0136 ..... $59
16MB 92G7204 ..... $89
PC 700 Model 750/6887 Model 730/6877
16MB 92G7320 ..... $89
32MB 92G7322 ..... $149
64MB 92G7324 ..... $299
PC 700 Model 730/6885/6886, Model 730/6873/6876
8MB 64S0130 ..... $59
16MB 92G7204 ..... $89
32MB 92G7205 ..... $149

COMPAQ

Presario 425, 433, 633, 680, 860, 800C, 900F, 0805, 833, 850, 866, Prolinea 4/33s, MT 4/50, MT 4/66, 4/25s, 4/33, 4/50, 4/66, 4/33s, enhanced 4/100, 4/33s, 4/50, 4/50s, 4/66, Net 1/25s, Net 1/33s
8MB 141685-001 ..... $69
16MB 149220-001 ..... $109
32MB 149147-001 ..... $169
Presario 510, 520, 524, 526, 528, 720, 724, 744, 774, 860, 930, 924, 954
8MB 147523-001 ..... $35
16MB 147524-001 ..... $99
32MB 147525-001 ..... $169
1MB Video 171017-001 ..... $39
Presario 972, 974, 978, 982, 993, 5526, 5528, 5536, 9536, 9546, 9548, 9564, Prolinea 4100, 466, 5120MT, 575MT, 590MT, 5100, 5133, 5120, 5100, 575, 590, ProLinea 450, 5100s, 5120s, 575s, 6130s, 6180s, Deskpro 4100, 450, 466, 575MT, 590MT, 5100, 5120, 5133, 575, 590
8MB 172713-001 ..... $35
16MB 172714-001 ..... $99
32MB 172715-001 ..... $169
1MB Video 171017-001 ..... $39
256K Cache 223557-001 ..... $69
Presario 7212, 7222, 7232, 7234, 7240
8MB 236568-001 ..... $35
16MB 236568-002 ..... $99
32MB n/a $179
64MB n/a $329
1MB Video 236709-001 ..... $39
Presario 9222, 9234, 9240, 9250, 9642, 9660
16MB 234566-001 ..... $99
32MB n/a $179
64MB n/a $329
1MB Video 213922-001 ..... $39
Prolinea 5133 2000/ME, 5150 2000/ME, 5166 2000/ME, 5100 840/1300 5120 1200, 5133 1200/2000, 5150 1200/2000, 5166 1200, Deskpro 5133 2000/ME, 5150 2000/ME, 5166 2000/ME, 5100 840/1300, 5120 1200, 5133 1200/2000, 5166 1200/2000, 575 840
8MB n/a $69
16MB 243011-001 ..... $99
32MB 243012-001 ..... $179
64MB 243013-001 ..... $279
128MB 243014-001 ..... $479
1MB Video 171017-001 ..... $39
2MB Video 233235-001 ..... $119
4MB Video 233236-001 ..... $279
Deskpro XE 560, 5/66M, 5/90M
16MB 149949-001 ..... $129
32MB 149912-001 ..... $269
1MB Video 139167-001 ..... $69
Deskpro XL 450, 466, 560, 566, 5100, 5120, 5133, 575, 590
16MB 148189-001 ..... $129
32MB 148190-001 ..... $199
64MB 148191-001 ..... $399
1MB Video 139167-001 ..... $69
Deskpro XL 6150 M90/CDS, 2100/90, XL 6200 2100/90
16MB 210948-001 ..... $119
32MB 228617-001 ..... $229
64MB 228618-001 ..... $449
2MB Video 233235-001 ..... $119
4MB Video 233236-001 ..... $279
Deskpro XE 4100, 433s, 450, 466
8MB 141685-001 ..... $69
1MB Video 139167-001 ..... $69
256K Cache 194358-001 ..... $49
Deskpro 2/25, 2/33s, 386/25M, 386/33M, 4/25S, 4/33, 4/66s, 486/33M, 486/50M, 486/66M, 486s/16M, 486s/25M, 486s/33M
8MB 128677-001 ..... $69

NEC

PowerMate & Ready 486 Models
16MB 150-082222-000 ..... $89
PowerMate 486 D/M Models
8MB OR-410-4004 ..... $49
16MB OR-410-4005 ..... $89
32MB OR-410-4006 ..... $149

NOTEBOOK MEMORY

AST

Ascentia P Models
8MB 503013-001 ..... $69
16MB 503013-002 ..... $129
Ascentia 660, A61, A62, A60s, A70s
8MB 503170-080 ..... $69
16MB 503170-081 ..... $119
32MB 503170-082 ..... $189
Ascentia J Models
8MB 501984-001 ..... $69
16MB 501985-001 ..... $105
32MB 501986-001 ..... $179
Ascentia 950N Models
8MB 501728-002 ..... $65
16MB 501728-003 ..... $99
Ascentia 900N & 910N Models
8MB 501392-002 ..... $79
16MB 501392-003 ..... $129
Ascentia 800N & 810N Models
8MB 501488-002 ..... $69
16MB 501488-003 ..... $109

COMPAQ

Armada 7710MT, 7730MT, 7750MT, 1510DM, 1520DM, 1550DMT, 1130, 1130T
8MB 272109-001 ..... $129
32MB 230580-001 ..... $229
Presario 1010,1020,1030,1060,1065, 1070,1075,1080
8MB n/a $69
16MB 261826-001 ..... $119
Armada 1100,1120,1120T,1125
8MB 220581-001 ..... $61
16MB 220582-001 ..... $109
32MB 220583-001 ..... $229
Armada 4100,4110, 4120, 4130,4131
8MB 217914-001 ..... $69
16MB 217915-001 ..... $109
32MB 217916-001 ..... $189
Elite Pentium 3000 Models
8MB 212515-001 ..... $69
16MB 212515-002 ..... $119
32MB 212515-003 ..... $209
64MB 212515-004 ..... $389
Contura 400, 410, 420, 430
8MB 147655-001 ..... $79
16MB 147657-001 ..... $109
LTE Elite 486 Models
8MB 199015-001 ..... $79
16MB 199017-001 ..... $139
Contura 4/25, 4/25CX, 4/25c
8MB 146521-001 ..... $79
16MB 114653-001 ..... $139
Contura Aero Models
8MB 190597-001 ..... $69
16MB 190598-001 ..... $129
Concerto 4/25, 4/33 Models
8MB 146790-002 ..... $59
16MB 146790-003 ..... $99

DELL

Latitude XP 450, 475, 4100 XPi Pentium
8MB 310-3435 ..... $59
16MB 310-3422 ..... $109
Latitude LM P100GD, P133GT
8MB n/a $69
16MB n/a $99
32MB n/a $229
Latitude 433m/mc, 450mt/mc, 475mc, LX 4100P/475
8MB n/a $59
16MB 310-3417 ..... $119
Latitude 433 Models
16MB 310-3286 ..... $119

digital

HiNote VP Pentium Models
8MB PB/PCP96AA $79
16MB PB/PCP96AB $129
HiNote Ultra 486 & Ultra II Pentium
8MB PB/PCP86AB $79
16MB PB/PCP86AC $129
HiNote 486 Models
8MB PB/PC79AB $79
16MB PB/PC79AC $129

NEC

Versa 6300MB, 6000MT
16MB OR-410-6202 ..... $119
32MB OR-410-6203 ..... $229
64MB OR-410-6204 ..... $449
Versa 3630CD,3633CD,3650CD, 3650CDX,3653CD,3655CDT
16MB OR-410-6600 ..... $99
32MB OR-410-6603 ..... $219
Versa 6000M,6010M,6030M,6030X, 6050MM,6050MB,6053MB
8MB OR-410-6200 ..... $59
16MB OR-410-6202 ..... $119
32MB OR-410-6203 ..... $209
Versa S, 500, 530, 2000, 2300, 2705,2400
8MB OR-410-1202 ..... $69
16MB OR-410-1203 ..... $119
Versa V, M, P 4000 4050 4080
8MB OR-410-4002 ..... $59
16MB OR-410-4003 ..... $119
32MB OR-410-4004 ..... $219

FUJITSU

Milan, Monte Carlo, Montego, Lifebook
8MB FPCEM01A $69
16MB FPCEM02A $129
32MB FPCEM03A $229

MICRON

Millennia Transport
16MB n/a $99
32MB n/a $219

HITACHI

C Series
8MB D3041A $59
16MB D3842A $119
E Series
8MB D3080A $59
16MB D3081A $119
M Series
8MB D3061A $59
16MB D3062A $119

WINBOOK

WinBook XP XPC Models
16MB n/a $119
32MB n/a $229
WinBook XPS
32MB n/a $279

GATEWAY 2000

Colorbook, Colorbook 2
16MB n/a $199
Solo 5/90, 5/120, W95, W90
8MB n/a $69
16MB n/a $129

IBM

ThinkPad 760E/ED/EL/ELD
8MB 92G7340 ..... $69
16MB 92G7341 ..... $119
32MB 92G7342 ..... $209
ThinkPad 365 X/XD & 560, 380
8MB 92G7340 ..... $69
16MB 92G7341 ..... $119
32MB 92G7342 ..... $249
ThinkPad 760C/CD/AD Pentium Models
8MB 92G7315 ..... $79
16MB 92G7316 ..... $139
32MB n/a $299
ThinkPad 701 Models
8MB 92G7261 ..... $89
16MB 92G7263 ..... $99
ThinkPad 750, 755 486 Models
8MB 07G1421 ..... $99
16MB 66D5109 ..... $149
ThinkPad 345, 360C/CE/CSE/E/FE, 370, 755 Pentium Models
8MB 84D8692 ..... $95
16MB 84D5695 ..... $139
32MB n/a $249

TEXAS INSTRUMENTS

Extensa 650,655,660CD,660CDT
16MB 9811344-0002 ..... $119
32MB 9811344-0003 ..... $279
TravelMate 6020, 6030 Models
8MB 9811456-0001 ..... $89
16MB 9811456-0002 ..... $119
TravelMate 5000, 5010, 5020, 5100, 5130, 5200, 5270, 5300 Models
8MB 9798816-0001 ..... $89
16MB 9798816-0002 ..... $139
Extensa 350, 355, 360, 370 Models
8MB 9808410-0001 ..... $69
16MB 9808441-0001 ..... $139
Extensa 510 & 515 Models
8MB** 9805763-0001 ..... $79
16MB** 9805763-0002 ..... $139
Extensa 430 & 435 Models
8MB 9803933-0001 ..... $69
16MB 9804002-0001 ..... $149

TOSHIBA

T100 T105 T110 T115 T400 T405 T410 T415 T420 T425 T430 T435 T610
Tecra 7, 7/720 730 740 Models
8MB NW2031U $69
16MB NW2032U $125
32MB NW2034U $239
Satellite 220 225 Satellite Pro 440 445 460 465
Tecra 500 510 520 530 Portage 650 860
8MB PA2038U $78
16MB PA2039U $109
32MB PA2040U $229
48MB PA2041U $349
Portage 300CT
32MB KIT-300/32 ..... $289
Tecra 700
16MB NW2036U $139
32MB NW2037U $269
T2100, T2105, T2110, T2115, T2150, T2155 Models
8MB NW2027U $69
16MB NW2028U $119
T1900 T1910 T-950, T1960, T4500
T4600, T4700, T4800 T4850, T6900
8MB PC-PA2013U $79
16MB PC-PA2014U $129

MEMORY AVAILABLE FOR THOUSANDS OF COMPUTERS & PRINTERS NOT LISTED!

CALL NOW FOR YOUR FREE CATALOG!

WORLD WIDE WEB HOT DEALS!

- Over 36,000 Products On-Line
- Detailed Product Information
- Latest Low Pricing – Updated Frequently
- Safe Secure On-Line Ordering
- Free Computer Product Giveaways
- Open 24 Hours a Day, 7 Days a Week

www.firstsource.com

EPSON

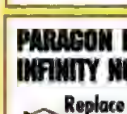
EPSON STYLUS 600
• 1440 x 1440 dpi
• 6 PPM Black
• 4 PPM Color
• Color Ink Jet
$282

3COM OFFICE CONNECT BUNDLE
• 5 - Etherlink XL PCI Card
• 1 - 8 Port Hub
3Com
$429

TOSHIBA SATELLITE 220CDS
• Intel Pentium 133MHz Processor
• 16MB RAM Standard
• 1.4GB Hard Disk Drive
• 10X CD-ROM
• 12.1" Color Display
TOSHIBA
$1,929

MICROSOFT OFFICE 97 STD.
Microsoft Office Standard Edition Full Upgrade!
* After $40 Mail-in Manufacturers Rebate
$179
Office 97
Microsoft

ADI SYSTEM 5V 17" MONITOR
• 16" Viewable Area
• .28mm
• 1280 x 1024
$496


PARAGON MEMORY INFINITY NOTEBOOK HD
Replace Your Hard Drive Not Your Notebook!
$299

800-237-9866
www.firstsource.com

MAIL OR FAX ORDERS TO:
[714) 448-7750 • FAX: (714) 448 7760
EMAIL ADDRESS: sales@firstsource.com
7 Journey • Aliso Viejo, California 92656
PSI SALES HOURS:
Monday - Friday: 6am - 5pm • Saturday, 7am - 4pm
TECH SUPPORT HOURS:
Monday - Friday • 7am - 5pm (All hours Pacific Standard Time)
Technical Support (714) 448-7770

CIRCLE 272 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

See new networking standards in motion.

GENERAL CONFERENCE • SECURITY SYMPOSIUM • COMMUNITY

TUTORIALS • WORKSHOPS • EXHIBITION

World's #1 Networking Forum

Step inside NetWorld™+Interop®—the world's largest interactive learning center for mission-critical networking solutions. In only days you can learn how to deploy the most advanced networking, Internet and intranet technologies on the planet. NetWorld+Interop has the expert knowledge and training you need to unleash a new generation of cutting-edge applications. Ones that give your organization the agility, power and flexibility to move forward—faster.

Atlanta, Georgia
Georgia World Congress Center
October 6–10, 1997

For Registration/Information:
1-800-944-4629
Int'l 415-372-7090
www.interop.com

SOFTBANKforums
NETWORLD +INTEROP

Tomorrow's Technologies In Action

See and test the technologies that will run your enterprise 2 years from now. NetWorld+Interop builds and manages the most diverse, enterprise-class, multivendor network in the world: the InteropNet™. Connecting over 600 top vendors to the Internet, the InteropNet lets you evaluate the newest standards in networking, live on the exhibition floor. This is your one chance to see emerging technologies at work, so do not get caught standing still. Pre-register to attend now.

©1997 SOFTBANK Forums. Interop is a registered trademark and NetWorld+Interop is a trademark of SOFTBANK Forums. NetWorld is a service mark of IDG World, Inc. All other marks are the property of their respective holders. CB17ESPA

CIRCLE 352 ON READER SERVICE CARD

PREMIER
Marketplace Shop www.marketplace.zdnet.com. Hundreds of ads, plus links to the web sites of more advertisers

PC MAGAZINE MARKETPLACE INDEX

MORE INFORMATION AND LINKS JUST ONE URL AWAY — *WHEN YOU NEED MORE INFORMATION TO MAKE YOUR* buying decisions than these ads provide, go to ZDNet **Marketplace**. Search a database of hundreds of ads by company, product and/or key words. Vendors can update their prices and product offerings daily. Plus, link to the web sites of advertisers for even more information. (Look for @www. under the ads in this section.) Bookmark www.marketplace.zdnet.com for more ads, more information and links to advertiser web sites.

HARDWARE PREMIER CLASSIFIED

Batteries 368
Boards/Components/Chips 351 368
Communications ..... 353 .....
Computer Systems 354 370
Input/Data Acquisition/Barcode/POS 357 371
Mass Storage Devices ..... 359 .....
Multi-Media ..... 360 .....
Peripherals 359 372
Power Supplies 373
Security 374

SOFTWARE

Barcode 374
Business Applications 363 374
Business Utilities ..... 363 .....
CD-ROM Titles 374
Communications 374
Education 363 374
Entertainment/Games .....
Financial/Accounting ..... 364 .....
Internet Tools/Utilities .....
Multi-Media ..... 365 .....
Scientific/Engineering .....
Security 375
Shareware/Public Domain ..... 366 .....
Adult 378

SERVICES PREMIER CLASSIFIED

Data Conversion/Data Recovery 375
On-Line 365 378
Software Duplication 377

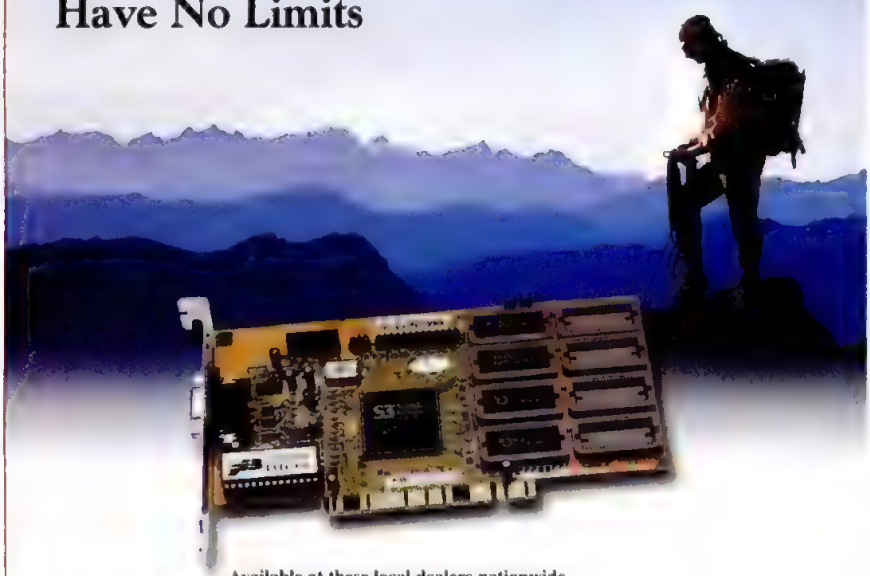
MISCELLANEOUS PREMIER CLASSIFIED

Business Opportunities 373
Supplies 378

MARKETPLACE SALES 800-825-4237

◆ Andrea Sachs ◆ Midwest x4579 ◆ Patricia Nunez ◆ Northeast x3628 ◆ Janet Fu ◆ Southwest x3131 ◆ Lisa Weseley ◆ Northern CA x3114 ◆ Jackie O'Hare ◆ Southeast x3133 ◆ Rachel Levy ◆ Northeast x3628 ◆ Bill Herbst ◆ Sales Manager x3905

Kouwell VGA Cards Have No Limits



Available at these local dealers nationwide

CA:	Micro Tech	(209) 438-7580	Multiple Locations:		
	Micro City	(619) 689-0660		Lucky Computers	(972) 705-2600
	Krista Micro	(714) 379-7395		Micro Supply	(206) 885-5420
TX:	Advanced PC	(972) 241-2744	NY:	GIG Computer	(518) 438-2444
OH:	HSB	(216) 498-1356	WI:	Valcom	(608) 836-8180
	Computer Creations	(937) 438-2777	Canada:		
KS:	National Computer Resource	(316) 682-9400		PC Source Systems	(905) 513-1811

Kouwell's New 64-bit PCI SVGA 3D Cards

True COLORS in 3D. Kouwell's new 3D KeyVision S3D uses the ViRGE/DX 64-bit 2D/3D Multimedia Accelerator, integrating 170 MHz of 24-bit true color RAMDAC and dual clock synthesizer for lightning fast 3D, 2D and video acceleration for PCs.

Kouwell also offers the blazing fast KeyVision 128-bit ET6000 video card using MDRAM for video memory.

128-bit MDRAM is 400% faster than 64-bit VRAM

Your Source for Quality IO Cards, SCSI Cards, Raid Controller Cards and Application Servers

KK Kouwell — *Koutech Systems, Inc.* "Quality is Everything"

For other locations please visit our website
www.koutech.com
www.kouwell.com
koutech.info@worldnet.att.net
OEM and Distributors Welcome!

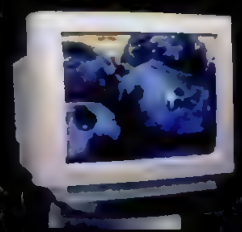
© 1996 Koutech Systems, Inc. 9314 Norwalk Blvd. Santa Fe Springs, CA. 90670. All trademarks are registered and belong to their respective owners

@www. OR CIRCLE 751 ON READER SERVICE CARD

YOUR SEARCH FOR THE LOWEST PRICE* IS OVER

Jaton Pentium MMX & 512K
$49

Matrox Millenium II VGA Card
$189



Princeton 15"/17" SVGA Digital Monitor
$245-$441

Western Digital 2.1 Gig Hard Drive
$170

USR 2X 56K Fax Modem
$155

SYSTEMS FOR SMALL BUSINESS
Intel MMX P166
$1118

SYSTEMS FOR STUDENTS
Intel P166
$1025

SYSTEMS FOR FAMILIES
Intel MMX P200
$1124

BUY ONLINE HERE

THOUSANDS OF PRODUCTS

UNLIMITED COMPUTER SYSTEMS

GUARANTEED LOW PRICES

24-HOUR CUSTOMER SERVICE

SECURE TRANSACTIONS

CyberCash

first time online buyers get an additional 10% OFF

NNA TECHNOLOGIES

www.nnatech.com

1 888 2281 NNA

DISCOVER

VISA

CALL OUR COMPETITION TO COMPARE!

CDW	(800) 726-4239
Compact Ability	(800) 554-9558
EPS	(800) 447-8821
Gateway 2000	(800) 424-1382
Insight	(800) 467-4448
Magic PC	(800) 762-4426
Micro Pro	(800) 353-3003
Micro Xpert	(800) 736-4276
Micron	(800) 708-0591
Midwest Micro	(800) 682-2611
NNA Technologies	(888) 228-1662
PC Importers	(800) 619-9119
PC Mall	(800) 681-3282
PCs Compleat	(800) 581-7911
Treasure Chest	(800) 677-9781
USA Flex	(800) 477-7778

NNA TECHNOLOGIES

@www. OR CIRCLE 758 ON READER SERVICE CARD

Shop Online . . . Go http://www.computerlane.com

Notebooks

Compaq Armanda
1510 P/133 $1695
1520 P/133 $1980
7750 P/133 $4995

IBM Thinkpad
380 P/133 $1995
380D P/133 $2250
560 P/133 $2175
760 P/133 $3890

Toshiba
T200CS P/133 $1795
T730XCD P/150 $4480
740CDT P/166 $5360
Liberto P50CT $deal

Peripheral

USR 56K Modem PCMCIA $199
Xircom Ethernet PCMCIA $159
HP Recordable CD-ROM $599
Iomega Jaz Ext $285
Memory Laptop WOW
16/32MB $89/165
Server Dim Memory WOW
16/32/64MB $145/360/475
Matrox Mill II 4MB $220

Authorized Dealer & Service Center
TOSHIBA
HEWLETT PACKARD
Novell.
IBM
Microsoft
COMPAQ
intel
We carry Parts in Stock for
COMPAQ
IBM • HP
TOSHIBA
For Warranty or Non-Warranty

Desktops

Compaq
2000 from $895
4000 from $1195
6000 from $1495

IBM PC 300
300GL $1099
300XL $2460

Toshiba Equim
5/166D $1645
5200D $1850

Hewlett Packard
Vectra 520 $995
Vectra 525 $1395
Vectra XU from $2195

Server

Prosignia 200 6/166 mdll $1599
Proliant 800 6/200 m4300 $2475
Proliant 2500 6/200 mdll $deal
Proliant 5000 $call
Proliant 6000 $call
Netserver E40 6/200 mdl $2275
Netserver LX 6/200 $deal
Netserver LH+ 6/200 $deal
PC Server 310 $call
PC Server 330 $call
PC Server 704 $call

Since 1983
800•526•3482
COMPUTERLANE INC.
7900 Topanga Canyon Blvd
Canoga Park CA 91303
comlane@instanet.com

@www. OR CIRCLE 752 ON READER SERVICE CARD

Micro Firmware
BIOS Upgrades
EIDE Disk Controllers
MICRO FIRMWARE
THE ONLY AUTHORIZED PHOENIX DEVELOPER AND DISTRIBUTOR SINCE 1987.

Features:
- Large hard drive support - 4 drives up to 8 gigs each
- Plug & Play support for Windows 95 ®
- Support for the newest operating systems and CPUs
- Multi-level password security built in
- None of the disadvantages of overlay software
- Best technical support before and after the sale.
- Free lifetime maintenance updates

MAJOR CREDIT CARDS, C.O.D. & PREPAY ORDERS ARE ACCEPTED
UNIVERSITY, INSTITUTIONAL & CORPORATE PURCHASE ORDERS WELCOME
1-405-321-8333
1-800-767-5465

CIRCLE 755 ON READER SERVICE CARD

MMX
intel inside
pentium II
Xtreme system
POWERMASTER ELITE
300
SIREX
Systematically Superior

CIRCLE 756 ON READER SERVICE CARD

40+ motherboards
Over 300 motherboard+CPU kits
award-winning systems, peripherals
hundreds of detailed specifications, pictures
24 hours a day, 7 days a week one web site
www.aberdeeninc.com/mag
888-267-3266
ABERDEEN
mag70910

@www. OR CIRCLE 753 ON READER SERVICE CARD

ZDNet Marketplace
Location: http://www.zdnet.com/marketplace

SHOP ON THE WEB, TOO!

Now you can shop Marketplace ads on the Web, as well as in print. Check out ZDNet Marketplace where ads from the Marketplace sections of our publications are online. You'll find hundreds of ads for hardware, software, supplies and services, all searchable by product category and key word terms. Search by specs, brand names, manufacturer, etc., and you'll find out who is selling what you want to buy. Link directly to many advertisers Web Sites for more information.

http://www.marketplace.zdnet.com

ZDNet Marketplace™

ENCORE ELECTRONICS INC.
THE SOURCE FOR YOUR
Novell Approved...
LAN PRODUCTS
• Complete Lan Cards
• Complete Hub Series
Full Duplex with Voice...
FAX/MODEM
• From 33.6K to 56.6K
• Speaker Function
16-bit Plug & Play...
SOUND CARDS
• Opti & Yamaha
• 3D Sound Card
World Wide Web: www.encore-usa.com
1•888•816•8668

CIRCLE 754 ON READER SERVICE CARD

Are you getting it?

Optimum Performance

Keyboard/Video & Mouse Switches

KVS does much more than just switch peripherals. But, with all the products on the market today, which system will be the best solution for your company? Give yourself complete control over your data center and how it's personel operate.

THE SMART CHOICE IS TRON.

Let experienced technicians take you through the Keyboard/Video Switch maze of vendors and products. After all, we introduced the technology to you in our Industry Standard *Keyboard/Video Switch(KVS) White Paper.* Tron uses and test KVS products in our own offices and lab.

Where each vendor promotes their own product, Tron can give you a complete comparison of several products all at once.

Call! for your copy of the White Paper

TRON INTERNATIONAL, INC.

(800) 808-4672

Or, download the Keyboard/Video Switch (KVS) White Paper from our internet site @tron.com

CIRCLE 757 ON READER SERVICE CARD

Breakthrough

In Keyboard Monitor Switches

Multi Platform & On-Screen Display

SEE US AT NETWORLD+INTEROP October 6-10, Atlanta, GA Booth #7622

BREAKTHROUGH the clutter of multiple keyboards, monitors, and mice with this latest INNOVATION from Rose. This switch has every feature you asked for

Switches several servers or computers to a single monitor, keyboard, and mouse

Supports any mix of PC, Apple, Sun, RS 6000, HP 700 series, DEC Alpha, SGI, or other computers from any keyboard or mouse

Front panel has keypad for easy selection of computers and configuration

Front panel display shows computers name and other information

Command to switch can come from keyboard, front panel, or RS232 port

Simple to use keystrokes switch computers for fast and easy control

Built in daisy-chaining supports up to 256 computers

Flash memory for future upgrade of features

Easy to use OverView™ system gives control and status with on-screen graphics

Many other features!

CALL FOR A FREE CATALOG:

- *Keyboard Video Control*
- *Print Servers*
- *Data Switches*

800-333-9343

VISIT OUR WEB SITE AT WWW.ROSEL.COM

ROSE ELECTRONICS

10707 STANCLIFF ROAD HOUSTON, TEXAS 77099 TEL 281-933-7673 FAX 281-933-0044

@www. OR CIRCLE 759 ON READER SERVICE CARD

Taking Command Just Got *Easier*

NEW! On Screen Management

The AutoBoot Commander 4xP is the state of the art switching system that allows users to access and control multiple computers from a single location. Better still, our new On Screen Management pop-up menus make it simple to name, configure and select your attached servers on the fly.

Easy Expansion for your Growing System

Designed for expansion, the 4xP grows with your installation, saving you time, space and money. Users can ultimately access and control as many as 3000 computers from a single location!

For growing systems with multiple users, the 4xP allows up to four users simultaneous access to any attached computer. Even more users can be added with the use of our expansion options.

Multiple Platforms

The 4xP is designed from the ground up to support multiple platforms: Mix and match PC, Sun, SGI, HP 9000, Dec Alpha, RS/6000, or Macs -- control them all with a single set of peripherals.

Take Command with the Cybex AutoBoot Commander 4xP!

CYBEX

Cybex Computer Products Corporation
4912 Research Drive Huntsville, Alabama 35805 USA
(800) 93CYBEX (29239) • (205) 430-4030 fax
http://www.cybex.com

BANYAN

Cybex, Cybex logo, Commander and AutoBoot are trademarks or registered trademarks of Cybex Computer Products Corporation. PC and RS/6000 are registered trademarks of International Business Machines Corporation. Mac is a registered trademark of Apple Computer Inc. Sun, SGI, HP and Dec Alpha are trademarks or registered trademarks of their respective companies.

See us at Networld & Interop, OCT 8 - 9 , Atlanta Booth# 3945E

@www. OR CIRCLE 760 ON READER SERVICE CARD

PREMIER Marketplace www.pcmagazine.com Hundreds of links to the websites of @www. advertisers

42ND ST PHOTO

378-5th Avenue, Between 35th & 36th St.

CORPORATE ACCOUNTS WELCOME

www.42photo.com

Local #: (212) 643-8855 Fax #: (212) 643-0608

888-870-4242

Store Hours: Mon-Friday ..9:00am-8:00pm
Sunday.....10:00am-7:00pm

IBM Notebooks

TP365X P133, 8/1.06G, 11.3" DS ..... Special
TP365XD P133, 8/1.35G, 11.3" DS, 6X CD $1579
TP380D P150 MMX, 16/2.1G, 12.1" TFT SVGA, 8X CD Special
TP380D, P150, 16/1.3G, 12.1" DS SVGA, 8X CD ...Special
TP380, P150, 16/1.08G, 12.1" DS SVGA, 8X CD $1699
TP560, P100, 8/810, 11.3" DS $1399
TP560,P133, 8/1.08G, 12.1" TFT..... Special
TP560,P133, 8/ 2.1G, 12.1" TFT..... Call
TP560,P133, 8/2.1G, 11.3" DS $2299
TP560E,P150 MMX, 16/ 2.1G, 11.3" DS..... $2399
TP560E,P166 MMX, 32/ 2.1G, 12.1" TFT..... Special
TP760E, P150, 16/2.1G, 12.1", TFT..... Call
TP760ED, P133, 16/2.1G, 12.1", TFT, 6X CD..... Call
TP760EL, P120, 8/1.08G,12.1", TFT..... Special
TP760EL P133, 16/.108G, 12.1", TFT..... Call
TP760EL, P133, 32/2.1G, 12.1", TFT..... Call
TP760XD P166MMX, 32/3.0G, 12.1", TFT, 8X CD ....Call
TP760XL, P166MMX, 16/2.1G, 12.1", TFT $3699
TP760XL, P 166MMX, 32/2.1G, 12.1", TFT..... Call
TP765D,P166 MMX, 32/ 3.0G, 13.3" TFT, 6XCD, 28.8k Special
TP765L,P166 MMX, 32/ 3.0G, 13.3" TFT, 28.8k Special

TEXAS INSTRUMENTS Notebooks

EXTENSA 610CD, P150 16/1.4G, 11.3"DS, 10X CD Special
EXTENSA 610CDT, P150, 16/1.4G,11.3" TFT, 10X CD Special
EXTENSA 655CD, P133, 16/1.35G, 12.1" DS, 10X CD $1699
EXTENSA 650CDT, P133, 16/2.1G $2999
EXTENSA 660CD, P166MMX, 16/1.35G..... Call
EXTENSA 660CDT, P166MMX, 16/2.1G, TFT, 10X CD $2599
EXTENSA 900, P133, 16/1.35G, 12.1" DS $2299
EXTENSA 900CDT, P133, 16/1.35G, 11.3" TFT....Call
EXTENSA 900T P133, 16/1.35G, 11.3" TFT..... Call
DOCKING STATION, Multi CD Rom w/ 2 extra battery bays $399
TM6020, P120, 8/810, 11.3" SVGA, 28.8K Mod Special
TM6030, P133, 16/1.35G, 12.1" SVGA TFT, 28.8k Special
TM6050, P150, 16/1.35G, 12.1" TFT, 28.8K Mod..Special
TM6050NT, P150, 32/2.1G, 12.1" SVGA, 10X CD $3799
TM6160 P166 MMX, 32/2.1G, 12.1" TFT, 10X CD ...Call
TM7060 P166 MMX, 32/2G, 12.1" TFT, 10X CD, 33.6k $4399
TM7063N P166 MMX, 32/3G, 12.1" TFT, 10X CD, 33.6k $5099

NEC Versa Notebooks

VERSA 2530, P133, 16/1.44G, 12.1" DS, ... $1699
VERSA 2630 CD, P133, 16/1.44G, 12.1", 10X CD ...Call
VERSA 2650CD, P150 MMX, 16/1.4G, 12.1", 10X CD .Call
VERSA 2650CDT, P150 MMX, 16/1.4G, 12.1" TFT, 10X CD $2999
VERSA 4080H, P120 MHZ, 8/1G, 10.4" Hi-Res TFT ..Call
VERSA 6030H, P133, 16/1.35G, SVGA TFT, 6X CD .Call
VERSA 6030X, P133, 16/1.44G, XGA TFT, 6X CD Special
VERSA 6050MH, P150 MMX, 16/1.4G, 12.1" TFT, 10X CD .Call
VERSA 6050MX, P150 MMX, 16/2.1G, 12.1" TFT, 10X CD..Call
VERSA 6050NT P150 MMX, 16/2.1G, 12.1" TFT,10X CD Call
VERSA 6250MX, P166 MMX, 32/2.1G, 13.3" TFT 10X CD $4999

Canon Notebooks

Innova 475CDT, P100, 8/810MB, 11.3 TFT, 4x CD $1399
Innova 490CDS, P133, 16/1.08G $1699
Innova 490CDT, P133, 16/1.08G..... Special

TOSHIBA Notebooks

T110CS, P100, 8 EDO/810MB, 11.3DSTN $959
T205CDS, P100, 8/810, 11.3" DSTN, 6X CD ..Special
T220CDS, P133, 16/1.44G, 12.1"DSTN, 10X CD .Special
T425CDS, P100, 8 EDO/810, DSTN, 6X CD $1199
T430CDS, P120, DSTN, 16/1.35 G, 11.3", 10X CD Special
T430CDT, P120, 16/1.35 G, TFT, 10X CD..... $1849
T440CDT, P133, 16/1.35 G, 12.1" TFT, 10X CD, 36.6k Special
T440CDX, P133, 16/1.34 G, 12.1" TFT, 10X CD ..Special
T460CDX, P166 MMX, 32/2.0 G, 12.1" TFT, 10X CD 33.6k Special
T510CDT, P133, 16 EDO/2 G, 12.1" TFT, 10X CD Special
T650CT, P133, 16/1.2 G, 11.3" TFT..... $2199
T650CDT, P133, 16/1.2 G, 11.3" TFT ..... Call
T730CDT, P150, 16/2G, 12.1" TFT, 6XCD..... Call
TECRA T500CDT, P120, PCI 16/1.2G, TFT, 6XCD ...Call
TECRA T500CS, P120, PCI 16 EDO/1.2 G $1599
TECRA T520CDT,P166 MMX, 32/2.1G, 12.1TFT, 10X, 33.6k Special
TECRA T530CDT,P166 MMX, 32.1G,12.1TFT, 1024x768,33.6k Special
TECRA T720CDT, P133, 16 EDO/1.2G, 12.1" TFT, 10XCD .Call
TECRA T730XCDT,P150, MMX, 16 EDO/2G,TFT 10X CD..Special
TECRA T730CDT, P150, 16 EDO/2G,TFT, 12.1", 10X CD..Call
TECRA T740CDT, P166 MMX, 16 EDO/ 2G, TFT, 10X CD $4799
TECRA T740CDT, P166 MMX, 16 EDO/3G, TFT, 10X CD...Call
PORTEGE T660CDT, P150 MMX, 16 EDO/1.35G, TFT, 10X CD..Call
PORTEGE T300CT,P133 MMX, 32MB EDO/1.5G, 10.4" TFT, 33.6k Call
LIBRETTO 50, P75,16/760 6.1 Active, 1.85 Lbs Special

digital Notebooks

Hi-Note VP520, P120, 8/1G, 11.3" DS, 6X CD ...$1999
Hi-Note VP565, P133, 16/1.4G, 12.1" TFT, 12X CD ...Call
Hi-Note VP562,P133 MMX, 16/1.4G, 12.1" TFT, 12X CD Special
Hi-Note VP567,P133 MMX, 16/1.4G, 12.1" TFT, 12X CD Special
Hi-Note VP575, P166 MMX, 16/2.1G 12.1" TFT, 12X CD $3759
Ultra II, P133, 16/1.35G, 11.3" TFT, Win95 ..... $4599
Ultra II, P150, 16/1.4G, 11.3" TFT, Win95..... Call

AST Ascentia Notebooks

ASCENTIA A80+, P150, 16/1.4G, 12.1" TFT SVGA, 10X..... $2699
ASCENTIA A70+, P150, 16/1.4G, 12.1" TFT SVGA, 10X, 33.6....Call
ASCENTIA P70, P150, 32/2.1G, 12.1" TFT, 10X, 28.8 Mod .....Call
ASCENTIA P90, P166, 32MB, 3.0GB HD, 12.1" TFT, 10X, 28.8 Mod $4599

Palmtop's Window CE

CASIOPEIA HANDHELD PC, 2 MB $429
CASIOPEIA HANDHELD PC, 4 MB $459
CASIOPEIA HANDHELD PC, 6 MB $559
COMPAQ PC COMPANION C120, 2MB ..... Call
COMPAQ PC COMPANION C120+, w/Modem ..... Call
COMPAQ PC COMPANION C140, 4MB ..... Call
HEWLETT PACKARD PALMTOP 300LX, 2MB $479
HEWLETT PACKARD PALMTOP 320LX, 4MB..... $659
NEC MOBILEPRO 200, 2MB..... $479
NEC MOBILEPRO 400, 4MB..... $599
US ROBOTICS PALM PILOT PERSONAL $279
US ROBOTICS PALM PILOT PROFESSIONAL..... $379
PHILIPS VELO ..... Call

COMPAQ Notebooks

ARMADA 1510DM, P120, 16/1.08G, 11.3" DS, 33.6k Special
ARMADA 1520DM, P133, 16/1.08G, 11.3" DS, 33.6k Special
ARMADA 1535DM,P133 MMX, 16/1.4G, 12.1" DS, 10X CD 33.6k $2399
ARMADA 1550DMT, P133, 16/1.4G, 12.1" TFT 10X CD, 33.6k Special
ARMADA 1585DMT,P150 MMX, 16/2.1G, 12.1" TFT 10X CD 33.6k $3499
ARMADA 4120, P120, 16/1.08G, 11.3" DS ..... Call
ARMADA 4120T, P120, 16/1.08G, 11.8" TFT ..... Call
ARMADA 4130T, P133, 16/1 08G, 11.8" TFT..... $2399
ARMADA 4150, P150 MMX, 16/1.6G, 12.1" DS..Special
ARMADA 4160T, P166 MMX, 16/2G, 12.1" TFT Special
ARMADA 7710MT, P150 MMX, 16/2.1G, 12.1"TFT, 33.6k Special
ARMADA 7730MT, P166 MMX, 32/2.1G, 12.1"TFT, $4999
ARMADA 7750MT, P166 MMX, 32/1.6 G, 12.1"TFT, 1024x768 $5799
PRESARIO 1210, P150MMX, 16/1.4G, 12.1" DS, 33.6 k, 14X CD Special
PRESARIO 1610, P150MMX, 16/1.6G, 12.1" DS, 56 k, 14X CD ..$2489
PRESARIO 1620,P166MMX, 16/2.1G, 12.1" STN, 56 k, 20X CD Special
PRESARIO 1080, P166MMX, 16/1.4G, 12.1" TFT, 33.6 k, 10X CD Special
LTE 5300, P133, 16/1.3G, 12.1" TFT $3299
LTE 5380, P133, 16/ 2.1G, 12.1" TFT $2999
LTE 5400, P150, 32/ 2.1G, 12.1" TFT ..... Call

Samsung Notebooks

SENS 810 P150, 16/2.1G, 12.1" TFT, 6XCD $2299
SENS 810 P133, 16/2.1G, 12.1" TFT, 6XCD, 28.8k Special
SENS PRO 520 P150, 48 2.1G, 12.1" TFT, 10XCD, NT Special
SENS PRO 520 P133, 16/1.4G, 12.1" TFT, 10XCD, NT Special
SENS PRO 520 P133, 32/2.1G, 12.1" TFT, 10XCD, NT Special
SENS PRO 500 P120, 16/1.4G, 12.1" TFT ..... Special
SENS PRO 500 P150, 16/2.1G, 12.1" TFT, 6XCD..$2399

HITACHI Notebooks

C-SERIES, P133, 8/1G, 12.1" TFT, 28.8 Modem $1999
E-SERIES, P133,16/1G, 11.3" DS, 28.8 Modem Special
E-SERIES, P133,16/1G, 11.3" TFT $1199
M-SERIES, P120,16/1G, 11.8" TFT, 8X CD $1699
M-SERIES, P133, 16/1G, 11.8" TFT, 6X CD, 28.8 Mod $1799
MX-SERIES, P150, 16/2 1G, 12.1" TFT 8X CD, 33.6k $2899
MX-SERIES, P133, 16/1.35G, 12.1" TFT, 8X CD 33.6k $2199
VISIONBOOK ELITE, P166, 16/2.1G, 13.3" TFT, 10X CD Special
VISIONBOOK PLUS, P133, 16/2.1G 12.1" DS, 10X CD 33.6k $1899
VISIONBOOK PLUS, P150 MMX, 16/1.4G, 12.1" DS, 10X CD 33.6k..Call
VISIONBOOK PLUS, P166 MMX, 16/2.1G, 12.1" DS, 10X CD, 33.6k ...Call
VISIONBOOK PRO, P133, 16/1.4G, 12.1" DS, 10X CD ...Call
VISIONBOOK PRO, P166 MMX, 32/2.1G, 12.1" DS, 10X CD ..$4699
VISIONBOOK PRO, P166 MMX, 32/3G, 13.3" TFT, 10X CD $4999

HEWLETT PACKARD Notebooks

OMNIBOOK 2000CS, P133, 16/1.4 G, 12.1" DS ...$2199
OMNIBOOK 2000CT, P133, 16/1.4 G 12.1" TFT ...$2799
OMNIBOOK 2000CT, P133 MHz, 16/2.1 G, 12.1" TFT..Special
OMNIBOOK 5500CS, P100, 16/810 ..... $1358
OMNIBOOK 5500CT, P120, 16/1.3 G, 11.3" DS Special
OMNIBOOK 5500CT, P133, 16/2G, 12.1TFT ..... Call
OMNIBOOK 5500CTS, P133, 16/1.35G, 12.1" TFT ...Call
OMNIBOOK 5700CT, P150 MMX, 16/2 G, 12.1" TFT..Call
OMNIBOOK 5700CT, P166 MMX, 16/ 2 G, 12.1" TFT, $4799
OMNIBOOK 5700CTX, P166 MMX, 32/2 G, 12.1" TFT..$5399
OMNIBOOK 800CS, P100, 16/810, 10" DS ...Special
OMNIBOOK 800CT, P133, 16/1440, 10" TFT .....Call
OMNIBOOK 800CT, P166 MMX, 16/2.1 G, 10.4" TFT $4299

FUJITSU Notebooks

LIFEBOOK 420D, P120, 16/1G, 11.3" DS, 10X CD ..Special
LIFEBOOK 435DX, P133 MMX, 16/1.3, 12.1" DS, 10X CD Special
LIFEBOOK 520D, P120, 8/810, 11.3" DS, 6X CD ...$1199
LIFEBOOK 520T, P133, 16/1.3G, 11.3" TFT, 6X CD, 28.8k $1599
LIFEBOOK 531T, P133, 16/1.3G, 11.3" TFT, 10X CD, 36.6k $1899
LIFEBOOK 535T, P133, 16/2.0G, 12.1" TFT, 10X CD, 36.6k Special
LIFEBOOK 555TX,P150 MMX, 16/2.0G, 12.1" TFT 10X CD, 36.6k $2198
LIFEBOOK 555T, P150, 16/1.3G, 12.1" TFT 6X CD, 28.8k Special
LIFEBOOK 555T, P150, 16/1.3G, 12.1" TFT, 6X CD, 28.8k ..Special
LIFEBOOK 565TX, P166 MMX, 32/2.0G, 12.1" TFT, 20X CD, 36.6k $3996
LIFEBOOK 635T, P133, 16/1.3G, 12.1" TFT, 6X CD, 28.8k ..Special
LIFEBOOK 655TX, P150 MMX, 16/1.3G, 12.1" TFT, 33.6k ...$2895
LIFEBOOK 656TX P150 MMX, 16/2.0, 12.1" TFT, 16X , 33.6k ..$3999

PCMCIA CARDS

XJACK 28.8 Cellular Modem $129
PCMCIA Lan 10 Base 1..... $59
PCMCIA Lan 10 Base 2..... $69
MPEG Card Zoom Video..... $199

LINEAR FLASH MEMORY CARD

ALSO FOR NEWTON 8 MB ..... $179 16 MB $329
2 MB ..... $69 10 MB ..... $229 20 MB ..... Call
4MB ..... $109 12 MB ..... $299 24 MB ..... Call

PCMCIA ATA FLASH MEMORY

ALSO FOR DIGITAL CAMERAS 16 MB ..... $329 40 MB $499
4 MB ..... $99 20 MB ..... $359 48 MB $599
8 MB ..... $159 24 MB ..... $409 56 MB $799
12 MB ..... $299 32 MB ..... $429 64 MB $999

Digital Cameras

Konica

Q MINI ..... SPECIAL
Q EZ DIGITAL ..... SPECIAL

OLYMPUS

D-300L 640x480 16.7 Million Color IN STOCK
NEW D-300L 1024X768 Resolution IN STOCK

Kodak

DC-20, DC-25, DC-50, DC 120 ..... $199.00 and up
NEW DC-120 1.4 Million Pixels
3X Power Zoom with Macro ..... CALL

Connectix

COLOR QUICKCAM 640X280 ..... $69.99 After Rebate
QUICKCAM 320X240 ..... $74.95 After Rebate

RICOH

ROC2E Wide angle Tele PCMCIA Slot $549.99
ROC1 24 Bit with motion $799.95

SONY

DCR-PC7 ..... CALL
DCR-VX1000 ..... CALL
DKC-ID1 ..... CALL

CASIO

QV 10A PLUS ..... 179.00 QV-11 ..... $229.00
QV-100 QV-120 ..... IN STOCK

SNAPPY 2.0 VIDEO SNAPSHOT ...$199.95 After Rebate

Due to industry price changes, call for current pricing and availability PRICES AND AVAILABILITY ARE SUBJECT TO CHANGE 15 day return and exchange All items returned must be in original packaging and documentation. A minimum 5% restocking fee may apply Shipping and handling are non-refundable No returns without RMA number All printers are not returnable unless defective All software are not returnable unless manufacturered sealed All items carry a Full Manufacturer's Warranty except of refurbished item. All logos and trademarks are registered tradmarks of their respective holders. Prices are valid for Mailorder only. Not responsible for typographical errors. Pictures used for illustration purposes only. We reserve the right to limit quantities. All prices and details in this ad are valid till the end of this month publication date. Prices valid for mailorder only.

Intel Pentium® Processor Based PC's
"At The Right Price"

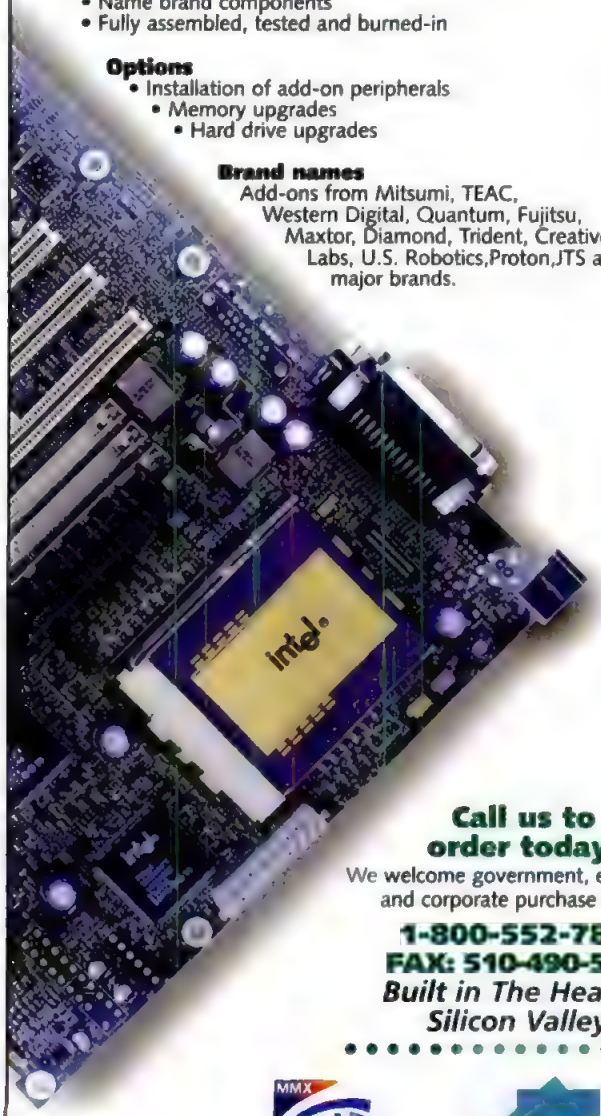
Intel Pentium® II processor and Pentium® processor based PC's by MEDIAON™

Every System Features An Intel Motherboard

- 2 year parts and labor warranty
- Name brand components
- Fully assembled, tested and burned-in

Options
- Installation of add-on peripherals
- Memory upgrades
- Hard drive upgrades

Brand names
Add-ons from Mitsumi, TEAC, Western Digital, Quantum, Fujitsu, Maxtor, Diamond, Trident, Creative Labs, U.S. Robotics, Proton, JTS and other major brands.



Systems by MEDIAON™

ExpertPro

Intel Pentium®II and Pentium Pro Processor based systems
- Intel Pentium®II or Pentium® Pro Processor
- Intel PD440FX ATX Motherboard with USB-Pentium II
- Intel VS440FX ATX Motherboard with USB-Pentium Pro
- 32MB EDO Memory
- ATX Mid Tower chassis
- UL/CSA approved 235 Watt power supply
- 24X IDE CD-ROM Drive
- 3GB IDE HD/Teac 1.44 Floppy Disk Drive
- Mitsumi 104 key PS/2 keyboard
- Microsoft PS/2 Mouse
- Microsoft Win NT 4.0 (Pentium Pro)-Win 95 (Pentium II)
- Diamond Stealth 3D 2MB VRAM Video
- Yamaha OPL sound system/80 Watt speakers-Pentium II

180 Pentium® Pro Processor.....$1,575.00
200 Pentium® Pro Processor.....$1,669.00
233 Pentium® II Processor.....$1,759.00
266 Pentium® II Processor.....$1,895.00

Expert II

Intel Pentium® processor based system with MMX™ technology
- Intel Pentium® Processor 166,200,233 MHz with MMX™ technology
- Intel TC430HX ATX motherboard w/built-in Sound, 512K Pipeline Burst Mode Cache, and USB
- ATX Mid-tower chassis with 235 Watt UL approved P/S
- 16MB EDO memory
- 16x CD-Rom Drive/80 Watt Speakers
- 2GB IDE HD/Teac 1.44 Floppy Disk Drive
- Mitsumi 104 keyboard/MS' PS/2 Mouse
- S3 3D 2MB Video (Upg. to 4MB)
- Microsoft Windows 95 CD-Rom

166 Pentium®Processor w/MMX™ technology.....$1,069.00
200 Pentium®Processor w/MMX™ technology.....$1,189.00
233 Pentium®Processor w/MMX™ technology.....$1,345.00

Call us to order today!
We welcome government, educational and corporate purchase orders!

1-800-552-7835
FAX: 510-490-5261
Built in The Heart of Silicon Valley!

MMX intel inside pentium

PROUD SPONSOR OF SILICON VALLEY BUSINESS THIS WEEK AS SEEN NATIONALLY ON KNOWLEDGE TV

MEDIAON
The Computer Experts™

Check out our website at www.mediaon.com for latest prices and configurations

"Monitor sold separately"

Prices and specifications subject to change without notice. MEDIAON™ and The Computer Experts are trademarks of MEDIAON™. Intel, Pentium and MMX are registered trademarks of Intel Corp. All other trademarks are properties of their respective owners.

@www. OR CIRCLE 762 ON READER SERVICE CARD

PREMIER ZDNet Marketplace Shop www.marketplace.zdnet.com. Hundreds of ads, plus links to the web sites of many advertisers

Real Hardware.

12.1" Color LCD Monitor • XGA High Resolution • 200cd/m² Brightness
Wide Viewing Angle • Active Matrix • Sealed • 2" Thin • VGA Compatible • 4 Mounting Options
Resistive or Capacitive Touchscreen Option • Multi-Scan 640 x 480 to 1024 x 768

DATALUX
http://www.datalux.com
1-800-DATALUX

@www. OR CIRCLE 763 ON READER SERVICE CARD

Siliconrax

Industrial/Rackmount Systems

- Completely Configured Systems
- Rackmount System Enclosures
- ACMA 4/12 Industrial Workstations
- Monitor + Keyboard Enclosures
- Singe Board Computers
- 3 to 20 Slot Passive Backplane (Up to 8 PCI slots)

For more information

800-700-8560

http://www.siliconrax.com
E-mail: info@siliconrax.com
Leasing option available
Tel 408-720-1090 Fax 408-245-2570
All major credit cards accepted.

CIRCLE 764 ON READER SERVICE CARD

Pivot base for all laptops,
possible alternative
to costly LCD projectors.

Weighs less than
an 8 ounce bag of feathers,
costs $29.95,
and guaranteed for life.

800.335.1610
www.roadtools.com

ROAD TOOLS™
north hampton, nh

Patent Pending

@www. OR CIRCLE 767 ON READER SERVICE CARD

The Right Projector at the Right Price!

NEW!

30 DAY MONEY BACK GUARANTEE
100% CUSTOMER SATISFACTION GUARANTEED

EPSON POWERLITE 7000
Call for Best Price
First portable true XGA

CTX EzPro 550
Call for Best Price

We'll Help You:
- With the largest selection of leading brands
- With FREE loaner units overnight

Lease A Projector For As Little As $110 Per Mo.!

- With technical support
- With our 20 years of experience.

Ask About Our FREE ABCs of LCDs.

Call Toll-Free 800-475-1986

AVI Audio Visual Innovations
Your Source For Being Seen And Heard

Mon-Fri. 8AM-8PM EST
For More Info Visit http://www.avinc.com

UPS FedEx

We Sell, Rent or Lease All Major Brands!

@www. OR CIRCLE 765 ON READER SERVICE CARD

Digital Camera PC Card Reader/Writers

- Win95, Win 3.x, DOS, Mac and Unix compatible
- PC Card Standard Type 1, 2 & 3
- Read/write on any SCSI system
- SRAM, flash disk, ATA flash, hard disks and compact flash

Phone: 1-800-451-1571 or (408) 379-0770 or Fax: (408) 379-3666
131-D Albright Way Los Gatos, CA 95032

VISA MasterCard

PCD-10 1-slot external reader/writer.....$349.00
PCD-15 2-slot external reader/writer.....$399.00
PCD-15 2-slot internal reader/writer.....$299.00

http://www.intermartsys.com

@www. OR CIRCLE 766 ON READER SERVICE CARD

NOW RENTING.
True 800 x 800 Resolution!

Great Image For Rent

Whether you need lightweight portability, high-resolution, incredible brightness or multimedia, we've got the right tools to make your bright ideas shine!

- Your rental fee applies towards the purchase of...
- Every system is tested for Guaranteed Performance!

http://www.boxlight.com

BOXLIGHT™
Presenting a better way

Look Bright Overnight! Call:
1-800-736-6954

CIRCLE 768 ON READER SERVICE CARD

Let us do the work for you.

When you're ready to rent or buy the latest presentation technology, look to Boxlight. We have searched all over the world for the finest hardware available and can supply you with the best equipment to meet your needs and budget. We "pre-shop" the entire industry to pick the highest value products from such trusted manufacturers as Infocus, Proxima, nView, Panasonic and Sanyo. And because we buy in volume, we can offer the best prices you'll find anywhere.

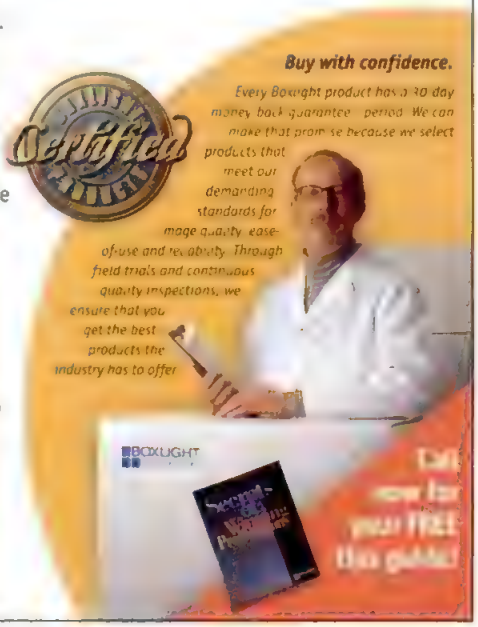
ASK US ABOUT RENTALS

It's as easy as 1,2,3.

You begin by discussing your needs with our team of presentation experts. When you've agreed on the best solution, it will be delivered directly to your office as early as the next day. You connect it to your PC, and it is ready to run—projecting full-color images onto a big screen.

We support your purchase with our superior package of services, from extended warranties and upgrade programs to free technical support.

It's what we call—"Boxlight Certified." It's what you'll call—satisfaction!



CALL US NOW AND WE'LL START WORKING FOR YOU TODAY

1-800-216-3396

Government: 800-497-4009
Resellers: 800-736-6956
International: 360-779-7901
Rental: 800-736-6954
Fax: 360-779-3299
Education: 800-689-6676

BOXLIGHT™ CORPORATION

Monday - Friday, 6AM-5PM PST. Purchase orders accepted w/ O.A.C. Prices subject to change. Quantities may be limited. Not all products are rental. 30-day money back guarantee does not apply to Resellers and Government entities. *Business lease is month-to-month lease requiring first and last month's payment at lease inception. Price does not include sales tax. Call for complete details.

http://www.boxlight.com/pcmag/

@www. OR CIRCLE 779 ON READER SERVICE CARD

SPEED. CAPACITY. CONNECTIVITY.

AND DID WE MENTION RELIABILITY?

- **DLT - Award-winning**, high-capacity, high-performance tape drives & libraries
  Store 15 GB - 400 GB system
  Backup up to 5 GB/hr
- **Half-inch cartridge** high performance IBM compatible solutions
  Exclusive 18 & 36-track read and write in one drive
  10 GB/hr transfer rates
- **9-track interchange** systems for fast, dependable mainframe to PC data interchange

Call today for the most cost-effective data storage solutions available

1-800-729-8725 or
619-571-5555
http://www.overlanddata.com

OVERLAND DATA
DRIVING THE INDUSTRY

CIRCLE 769 ON READER SERVICE CARD

DOS · WINDOWS · 95 · NT · OS/2 · UNIX

DATA INTERCHANGE · DATA INTERCHANGE

Chi East–800-828-0599
West–800-928-9099
Data Interchange & Storage Expert

Headquarters—**Chi Corporation**
30275 Bainbridge Rd. Suite 2A
Solon OH 44139
216 349 8605 Fax 216 349 8609

Phoenix Office—**Chi Corporation**
10640 North 28th Dr., Bldg C205 Suite 21
Phoenix AZ 65029
602 548 9010 Fax 602 548 9041

Nine Track Tape Systems
All Densities–800/1600/3200/6250
All Platforms

3480/3490/3490E/3590
compatible
Single Load or 10 or 60 cartridge Libraries

DLT–4mm–8mm
Complete Network backup Solutions–Novell, NT, Unix
Libraries by ADIC

DataConversion Services
4mm, 8mm, 9trk, 3480, 3490, 3490E, EVEN TO CD

CD ROM Recorders
2x/6x, 4x/6x,—All platforms
Media Form CD duplication systems

CD ROM Jukeboxes
NSM, SONY, JVC, Pioneer, Cygnet

Chi Corporation: Manufacturers of the *Award Winning* OutRight and ReelView II Software

CD ROM Jukebox
For Novell or NT Software by Smart Storage

CHI 1635
35 Disk capacity with 7–16x CD ROM Readers
Includes all necessary software, cables, SCSI card

Also Availiable in other configurations
1620 -20 slot, 4-16x readers,1625-25 slot, 5-16x readers
1630-30 slot,6-16x readers,1635R-30 slot,6-16x readers,
One Yamaha 4x CD recorder, 6x reader

www.chi corporation.com

CIRCLE 771 ON READER SERVICE CARD

MAC SUN UNIX DOS WINDOWS AIX OS2

3480 3490

Your Tape Connection Source

- ✔ *Mainframe ◄► PC*
- ✔ *Tape ◄► CD*
- ✔ *Data Exchange/Backup*
- ✔ *Data Conversion*
  TAR, CPIO, VMS SAVESET, ASCII, EBCDIC
- ✔ *1 year Onsite Warranty*

Featuring FUJITSU *Quality Products*

(800) CPU-3480

Computer Peripherals Unlimited Inc.
2355 N. Steves Blvd., Suite C • Flagstaff, AZ 86004
(602) 396-3616 Phone • (602) 396-0483 Fax

3480 3490 3490E 9-Track 8mm 4mm

CIRCLE 770 ON READER SERVICE CARD

Custom ULTRA SCSI Tools

SCSIVue Active Terminator from $59
- Improves SCSI Bus Performance
- Less Errors, More Reliable Data Transfer
- Diagnoses Problems • Analyzes Signal Quality
- Active Regulation • Fast 50 & Fast Wide 68
- Status Indicators • Gold Contacts

SCSIVue Cables from $39
- Triple Shielding (Unique Design)
- Double Gold 20u" Plated Connectors
- Diagnostic Indicators • Large Ferrite Filters
- Ultra Heavy 26 Gauge Wire • 100 Styles in Stock

Custom Teflon® Internal Cables from $39
- Less Errors, Ultimate Performance
- Silver Wire Improves Signal Quality
- Perfect 90 Ohm Impedance • Custom in 1 Day
- Triple Pronged Connector - Gold contacts Silver Wire

Diagnostic Adapters $39
- 68 Pin Drive to 50 Pin IDC (Runs wide drive as narrow)
- 68 Pin External Adapter to 50 Pin (converts Host Adapter)
- Gender Changers both 50 and 68 pin (all combinations)
- Adapters with partial termination for 68 to 50 converters

SCSI Cable Tester - LED Readout
This Digital SCSI Cable Tester can test all the popular cable styles for opens, shorts, and unreliable operation. Battery powered for easy use.

Ultra SCSI Cases & Accessories

CIRCLE 772 ON READER SERVICE CARD

ONE LINK TO HUNDREDS OF VENDORS

http://www.marketplace.zdnet.com

ZDNet Marketplace™

Wireless Printing

Share Printers Without Wires or a Network

- ▲ Prints 100 to 500 feet – through walls
- ▲ Configurations for up to 8 printers
- ▲ No additional software or cards
- ▲ 100% IBM compatible

30 Day Money Back

Go Print™
AEROCOMM

800-492-2320
www.aerocomm.com

NEW LOWER PRICE

CIRCLE 773 ON READER SERVICE CARD

PREMIER Marketplace @www.

PD Today's Storage

PD isn't *just* a high-capacity, removable storage solution... By utilizing ***rewritable*** DVD technology, it's designed with the future in mind. That's why manufacturers of advanced systems like Compaq's Deskpro and the IBM PC 365 model 14U include the PD.

They know PD gives their users the features they need:

- A whopping 650MB of storage on a single, rewritable disk
- Unlimited storage for about 4.5¢/MB—just add another disk
- Rugged, reliable storage that isn't affected by head crashes, stray magnetic fields, harsh environments, or rough handling
- Easy storage of video, audio, graphics, and Internet files
- Unlike CD-R, PD media is ***rewritable***
- PD media has a data life of 30+ years
- And, they'll be able to read their PD media with future Panasonic DVD-RAM drives

Compaq Deskpro with PD Drive

Use it for low-cost, reliable storage of desktop publishing work, prepress production files, multimedia development, Internet file downloading, and backing up your system.

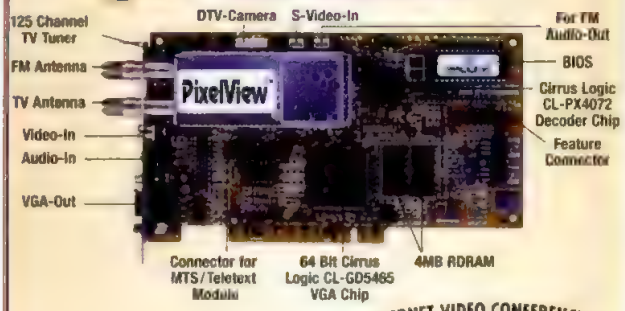
The versatile PD also plays your CD-ROMs, CD-R, photo-CDs and even audio CDs...flawlessly.

PD, the 650MB ***rewritable*** optical drive with economical, easy to use, removable media *and* built-in CD-ROM.

For the storage solution that meets your needs today and tomorrow, visit the Compaq, IBM, Panasonic web sites; or call us for the name of the authorized PD dealer nearest you.

IBM PC 365 Model 14U with PD Drive

NEW!
3D PixelView
3D Combo TV



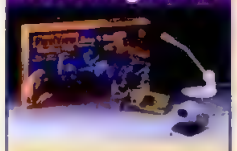
- Resolution up to 1600 x 1200, 64K Colors (4MB)
- Support NTSC/PAL/SECAM Standard

→ *Various Functions*

- Watch TV or LD, VCR, CAM
- Listen to FM Radio
- MPEG Movie Playback
- Play 3D Games or 3D Programs
- Video Conferencing with Optional CAM

INTERNET VIDEO CONFERENCING SOLUTION

PixelView Meeting PAK



Video Conferencing over Internet or point to point at any existing PC

- PCI 2.1 Compliance with Plug & Play Capabilities

PROLINK

PROLINK COMPUTER INC. (USA)
Tel 626 369 3833 800 686 8100 Fax 626 369 4883
email sales@prolink.usa.com

Website: http://www.prolink-usa.com

@www. OR CIRCLE 775 ON READER SERVICE CARD

Make the Connection

Featuring D-Link networking Products

Adapters, switches, hubs, routers, ...All your networking product needs from the company with the "Commitment to Connectivity" are now available at internet-direct prices

ibuydirect.com

Presentation Products from Setec

Remote Wireless Mouse with Laser Pointer and Screen Annotation Software, PC-to-TV Converter, and Data-grade 29" Presentation Monitors

http//:www.ibuydirect.com SETEC

CIRCLE 776 ON READER SERVICE CARD

Solution For . . .

Tomorrow's Technology.

• 650MB removable media
• Rewritable optical drive
• Built-in CD-ROM

COMPAQ
www.compaq.com

IBM
www.ibm.com

Panasonic
(800) 742-8086 Ext. PD
www.panasonic.com/alive

Ref PD-B

© 1998 Panasonic. All rights reserved. The IBM logo is a registered trademark of International Business Machines Corporation. The Compaq Deskpro and Compaq Logo are registered trademarks of Compaq Computer Incorporation. All other copy rights or trademarks are property of their respective owners.

@www. OR CIRCLE 774 ON READER SERVICE CARD

TAKE Control
of 2 to 64 computers

MasterConsole

Managing Multiple Servers?
Save time, space and money! Raritan's MasterConsole will give you rock-solid, reliable control of all your systems—**PCs, Macs, Suns**—from a single keyboard, monitor and mouse. Tens of thousands of organizations rely on MasterConsole every minute of every day. So can you!

"We've installed hundreds around the world. They just don't break. Nothing else compares."

Dan Desmond
President
Advanced Networks

Raritan (800) RCI-8090 x41

Raritan Computer, Inc.
400 Cottontail Lane,
Somerset, NJ 08873

E-mail: sales@raritan.com
http://www.raritan.com

Tel. 908.764-8886
Fax 908.764-8887

See us at NETWORLD/INTEROP ATLANTA, OCTOBER 8 -10 Booth #8012

CIRCLE 777 ON READER SERVICE CARD

The Hottest Concept in Notebook Cases on the Market Today!

Never has hard-shell protection looked so good and been so affordable. The Showcase Adjustable Compartment Case is a sleek custom molded hard-shell notebook carrying case with the Smart Track System permanently mounted inside. This system gives you the flexibility to create any size compartment you may need for your notebook, and accessories and the option to change these compartments as often as you wish.

SHOWCASE TECHNOLOGIES
Carrying You into the Future!™

HARD-SHELL PROTECTION...
SOFT-SHELL PRICE.
$179.95
INCLUDES SHIPPING AND HANDLING
UPS Ground Next Day and Second Day Air Available

Laptop case Model #SH-01 comes complete with permanently mounted inner frame, 1-6" mar 2-4 bars, 1-2 bars and shoulder strap. Cases available in black, grey, and burgundy.

TOLL-FREE 24 HOUR ORDER HOTLINE 1-888-268-5441
www.showcasetech.com

@www. OR CIRCLE 776 ON READER SERVICE CARD

PREMIER Marketplace Shop www.marketplace.zdnet.com hundreds of ads, plus links to the Web sites of www.zdnet.com advertisers

First we made a notebook projector light and portable enough to take on the run. Then we made it considerably less expensive than any comparable SVGA projector on the market.

And just like our entire family of projectors, it's incredibly easy to use.

NEW BREAKTHROUGH PRICE
SVGA/VP800
$2,995
through 12/31/97

Just plug it into your notebook, turn it on, and you're ready to make a big presentation. You'll not only get all the power and brightness you need, but at a mere 9.3 pounds, you'll have the flexibility to take it anywhere you want. Because there's no bad place to present a good idea.

LIGHTWARE

For a free demo, call 1-800-445-9396 or visit our website at www.lightware.com

Valid for VP800 only. Price subject to change without notice in U.S. dollars and valid only in the U.S. Available at participating dealers.

★★★★½ Presentation Magazine

MacUser

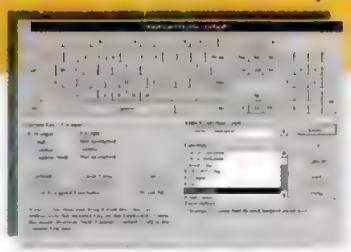
1996 Finalist MVP PC Computing

PC

CIRCLE 780 ON READER SERVICE CARD

Distinct IntelliTerm

Integrated Terminal Emulator for DEC and IBM® Systems



Highlights:

- TN3270 Emulation-Models 2,3,4 and 5 (for IBM Mainframes)
- 3179G Vector Graphics & 3279S3G
- TN5250 (24x80, 27x132) (for AS/400)
- VT52, VT100, VT220, VT320 & VT420 emulation (for DEC and UNIX Systems)
- Customizable keyboard layouts, poppads and session profiles
- VBA™ Advanced Scripting Language
- DDE, HLLAPI, EHLLAPI, WinHLLAPI and Visual Basic™
- Available for Windows 3.11, Windows 95 and Windows NT

distinct

The world leader in internet developmental tools.

408.366.8933

http://www.distinct.com

Fax: 408.366.0153

E-mail: sales@distinct.com

CIRCLE 781 ON READER SERVICE CARD

Keep your PCs up & running with the 100% accurate fix...

Micro-Scope is a universal PC diagnostic that runs a proprietary O/S which eliminates DOS limitations and inaccuracies. Version 6.16 adds 25 enhancements and includes: IDE low-level format, accurate IRQ conflict display, cache memory test, 64 meg video memory test, data recovery capabilities, virus capabilities and super-fast hard drive testing.

Post-Probe is a universal P.O.S.T. (Power-On Self-Test) reader card for the "dead" PC. Post-Probe includes: MCA adapter, tri-state logic probe, 13 LED pre-POST test, 2-digit POST code display and a manual with a full explanation of the manufacturer POST codes down to the exact device or chip failure.

Micro 2000, Inc.
1100 E. Broadway, 3rd Floor
Glendale, CA 91205
Toll Free 1 (800) 864-8008
Fax (818) 547-0397
http://www.micro2000.com

Award Winning MICRO 2000

@www. OR CIRCLE 782 ON READER SERVICE CARD

GET MCSE, CNE OR A+ CERTIFIED... FAST!

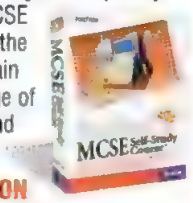
The first *100%* Computer Based Training (CBT) programs on CD-ROM to fully prepare you for Novell's CNE, Microsoft's MCSE and the A+ Certification exams. ForeFront's Self-Study Courses give you flexibility and portability unmatched by traditional training methods. You'll study at your own pace using our easy to follow, step-by-step format. Study whenever and wherever it's convenient for you!

- **All on one CD**
- **Interactive simulations for hands-on exercises**
- **Study at your own pace**
- **Hundreds of practice questions**
- **Priced below competitive products**
- **Everything you need to prepare for the exams!**

Bonus!!!
Buy Any Two CBTs and get The Micro House Technical Library™ FREE

The ForeFront MCSE Self-Study Course™

Ensures the highest rate of retention so that when you complete your training you'll be fully prepared to pass your MCSE exams. You'll be ready and confident to go into the workplace to effectively plan, implement, maintain and support information systems in a wide range of computing environments, using Windows NT and other Microsoft Server products.



The ForeFront A+ CERTIFICATION Self-Study Course™

Getting A+ Certified will help open the way to further advancement in the corporate world. A+ Certification is the new required standard for PC Repair Technicians. This hands-on self-study course will give you all the technical material, knowledge, interactive exercises, and confidence you'll need to pass your exams and excel in today's competitive PC repair marketplace!

The ForeFront CNE Self-Study Course™

Provides fast, effective and convenient training to anyone wishing to become a Certified NetWare Engineer, even when hampered by a busy schedule. Our CNE CBT allows you to learn *everything* you'll need for full NetWare certification.

Call for Special Discount Pricing Today!

1-800-475-5831

(813) 724-8994 • FAX (813) 726-6922 PM

25400 U.S. Hwy. 19 N., #285 Clearwater, FL 33763

MasterCard VISA AMERICAN EXPRESS DISCOVER NOVUS

- **Free Technical Support**
- **Next Day Shipping**
- **Performance Guaranteed**

FORE FRONT DIRECT

CIRCLE 783 ON READER SERVICE CARD

PREMIER Marketplace

Training Videos for Windows Software

KeyStone Learning Systems Corp.

Dan Balter
Microsoft MCSE & Windows NT Instructor

Dennis Taylor
Microsoft Excel Specialist & Excel Instructor

Dawn Bjork
Microsoft Certified & Word Instructor

Alison Balter
Microsoft Certified Developer & Access Instructor

Windows NT 4.0
Serv. Ad. Lev 1-2 (ea) $89.95
Entrp. Ad. Lev 1-2(ea) $89.95
Covers Exam 70-68
Special All Four $329.95
Serv. & Wrk. Install $89.95
Covers Exam 70-63 & 70-73
Workstn. Admn. Lev 1 $89.95
Workstn. Admn. Lev 2 $89.95
Workstn. Admn. Lev 3 $89.95
Special All Four $329.95
Covers Exam 70-73
Workstn. User Level 1 $49.95
Workstn. User Level 2 $49.95
Both Videos $89.95
Special All Ten $669.95

Excel 97
Beginning $49.95
Intermediate $49.95
Advanced $49.95
Power Features $49.95
Pivot Tables $49.95
Shortcuts & Ideas $49.95

Word 97
Beg/Int/Adv (ea) $49.95
Desktop Publishing $49.95
Mail Merge $49.95
Tables & Forms $49.95
Internet $49.95

Project 4.1
Level 1 $89.95
Level 2 $89.95
Level 3 $89.95
Level 4 $89.95

Windows 95
Beg/Int/Adv (ea) $49.95
Special All Three $129.95
Networking 49.95
Installation 49.95
Special Features 49.95
Special All Six $239.95

Exchange 5.x
Internet Explorer $49.95

Netscape Navigator $49.95

Developer Lev 1-6 (ea) $89.95
Free Book & CD w/Dev.

Beg/Int/Adv (ea) $49.95
DTP/Mail Mrg. (ea) $49.95
Tables & Forms $49.95

Over 500 Titles

KEYNOTES

30 DAY

Special MS Office 97 Video Combinations
MS Office 97 Plus (16 videos/29 hours) $579.95
MS Office 97 Pro (13 videos/24 hours) $495.95
MS Office 97 Standard (9 videos/17 hours) $349.95

Special Lotus Smartsuite 97 Video Combinations
Lotus SmartSuite 97 Plus (16 videos/29 hours) $574.95
Lotus SmartSuite 97 Pro (13 videos/24 hours) $495.95
Lotus SmartSuite 97 Standard (9 videos/17 hours) $349.95

Special Corel Office Video Combinations
Corel Office Professional 8 (15 videos/29 hours) $579.95
Corel WordPerfect 8 Suite Pro (13 videos/24 hours) $495.95
Corel WordPerfect 8 Suite Standard (9 videos/17 hours) $349.95

4 Easy Ways to Order
CALL 1-800-775-5925
801-375-8680
FAX 1-801-373-6872
WWW www.klscorp.com
MAIL KeyStone Learning Systems Corp.
2241 Larsen Parkway • Provo, UT 84606

@www. OR CIRCLE 784 ON READER SERVICE CARD

Get Certified!

MCSE
6 Study Guides
6 CD ROMs
$ 249.95
Covers Windows NT 4.0

A+ Certification
$ 259.95
• 3 Books
• 2 CD ROMs

7 Videos for NetWare IntranetWare 4.11
2 Novell Press Study Guides 3 CDs
www.lantell.com
800-526-8355
16250 Ventura Blvd # 202 Encino CA 91436 818 905 1262 Fax 905 1292

CIRCLE 785 ON READER SERVICE CARD

COMPUTER CHECKS

BUY DESIGNER DIRECT FOR LOWEST PRICES!

Laser/Inkjet
Continuous Checks and Check Savers Also Available.

As Low as $29.95

CALL: 1-800-239-4087
FAX ORDERS: 1-800-774-1118
(PLEASE CALL FOR A FAX ORDER FORM)
MC, VISA & AMERICAN EXPRESS ACCEPTED

Internet: http://www.hotnew.com/checks/
E-Mail: info@checks.hotnew.com

- QUICKEN
- SIMPLY MONEY
- MICROSOFT MONEY
- MANY MORE

Laser and Continuous Feed Checks available in:
- Business Size
- Business Size with Voucher
- Wallet Size

Available in Quantities of 250, 500, 1000 and 2000.
Choose From 4 Stylish Colors!

Classic Blue Tan Classic Green Prestige

Designer Checks
P.O. Box 13367 • Birmingham • AL

PO7D04D6 • P.C. MAGAZINE

CIRCLE 787 ON READER SERVICE CARD

The Best Accounting for the Best Businesses!

Designed to automate your business, U.A. Corporate Accounting™ is the most powerful customizable accounting software available today!

Accounts Receivable
Accounts Payable
General Ledger
Order Entry
Payroll
Inventory
Job Costing
Purchase Order

Unlimited Access To Your Information!

Completely customizable using Microsoft Access, the U.A. Corporate Accounting system is a virtual part of the Microsoft Office suite. 32-bit software designed for Microsoft® Windows® 95 Microsoft® Windows NT™ Microsoft® SQL Server™

UA Corporate Accounting

1-800-853-8837

Phone (504)851-6600
Fax (504)851-6007
Advanced Software Development Corp.

CIRCLE 786 ON READER SERVICE CARD

Retail Accounting
without the hassles!

Bar Code Scanning . Inventory Management

NO Accounting Knowledge Needed

Easiest Way to Manage your Business

Try the Award-Winning & #1 Selling POS Software for only: $595* Limited Time Offer

100% Satisfaction Guaranteed

(800) 672-7470
http://www.targetsoftware.com

@www. OR CIRCLE 788 ON READER SERVICE CARD

LinksLS
1998 Edition
THE ART *and the* SCIENCE *of* GOLF

Introducing the Links LS 1998 Edition. The forces of art and science have combined to produce a golf experience like never before. This new version of the Codie Award winning golf simulation is packed with over 25 new features! Here's just a few:

Actual Links LS '98 screen capture

- lightening-fast redraws, main view in a window capability, and up to 8 additional "smart" camera views
- new water reflections, improved textures and enhanced sky backgrounds
- waving flags, birds, airplanes and other background animations with up to 8 of your friends over expanded internet play!

ACCESS
THE REAL WORLD INTERNET

Phone Toll-Free 800 800 4880 • Fax 801 359 2968
Website-http://www.AccessSoftware.com Available for the PC

CIRCLE 800 ON READER SERVICE CARD

Display SVGA on your TV!

TV SuperScan2 converts SVGA (1024 x 768) into a video signal. This scan converter has exclusive Video Buffer Technology and will work with any operating system or platform using SVGA.

- Now with infra-red remote control!
- Supports 1024 x 768 in up to 16.7 million colors
- On Screen Menu
- Broadcast quality (RS-170) for video broadcasting or taping
- Now with Zoom, Draw, Screen Capture and more!

For more information or a dealer nearest you call:
1-800 888-5244
Sales: (562) 926-1928
FAX: (562) 926-0518

Literature FaxBack Service: (562) 926-5207
Visit our website at http://www.AOSTECH.com

CIRCLE 790 ON READER SERVICE CARD

Is your credit in order? Is your network?

simplicity
profitability
security

NO HASSLE WITH ADDITIONAL SOFTWARE OR PROGRAMMING; EVERYTHING'S MANAGED THROUGH CALLECT.COM SERVER

FREE EVALUATION!

CALLect
www.callect.com

ALL COMMON CREDIT CARDS ACCEPTED, BUT CARD NUMBERS NEVER APPEAR ON THE INTERNET

PURCHASE OF CREDITS IS DONE OFF-LINE ON A 100% SECURE TOLL FREE TELEPHONE PLATFORM.

Connect your business to CREDIT CARD SYSTEMS

@www. OR CIRCLE 791 ON READER SERVICE CARD

CADET Data Radio
AM/FM Radio and Data in your PC

AM/FM stereo receiver featuring RDS (Radio Data System) which displays data sent via radio broadcasts. The CADET produces home-stereo quality audio so you can work or surf the web while you listen to music or the ball game.

- Installs in seconds - Plug and Play
- Display of station call letters, artist name, song title and other data
- Seek/Scan by station format (rock, jazz, talk, country, etc.)
- 100 FM presets - 50 AM presets
- Radio on Demand™ (VCR-like programmed recording of radio programs)
- Future software enhancements include radio paging, e-mail alerts, and more

For more information or a dealer nearest you call:
1-800 888-5244
Sales: (562) 926-1928
FAX: (562) 926-0518

Literature FaxBack Service: (562) 926-5207
Visit our website at http://www.AOSTECH.com

CIRCLE 792 ON READER SERVICE CARD

PREMIER Marketplace

Finally! Windows 95 and Macs Share Files and Printers Both Ways

Workgroups and small offices can now operate as efficiently as an enterprise with **PC MACLAN for Windows 95**. Low cost, plug and play installation, Network Neighborhood and long file name support, are just a few of the features that make sharing files, volumes and printers between Macs and PCs a snap.

"For peer-to-peer networking . . . PC MACLAN 6.0 is the only choice."
Macworld Nov 96

Create your own network or complement almost any pre-existing LAN. Sharing information between Windows 95 and Macintosh users is as easy as working off your local hard drive. Print jobs go to the printer of your choice regardless of its location on the network.

For ordering or information:
800-862-2526
e-mail: sales@miramarsys.com
Web: www.miramarsys.com
Miramar Systems, Inc.

Please visit us at these upcoming shows:
Seybold SF - Oct. 1-3, Booth #2428
Cue - Oct. 16 - 18, Booth # 902

CIRCLE 793 ON READER SERVICE CARD

The Most Advanced Internet Service Available

Online Marketing — Full Service Web Marketing

$18.95/month

FREE EXTRAS
WWWboard installed • Guestbook installed
Free for all links page installed

- True virtual domain
- http://your-name.com/
- Access to our SSL
- Full POP mailbox
- Unlimited Email aliases
- Unlimited Infobots
- 3 Gigs of monthly transfer
- 50 megs of space
- Anonymous FTP site
- Weekly usage stats
- Your own cgi-bin full of scripts
- Front page supported

ADVANCED WEBPAGE ADMINISTRATION!

Visit us for same day setup—www.olm.net
Contact us sales@olm.net or 800-741-6813

CIRCLE 796 ON READER SERVICE CARD

Web Hosting $16.95

Masterpiece Web Creations

E-mail Accounts
Domain Name Registration (www.YOURNAME.com)
Site Design and Assistance
FrontPage Support
Database Connectivity
Access to Secure Server
Credit Card Transaction Hosting

No Minimum Contract
Resellers get HUGE discounts!

Reiter Associates, Inc. www.reiterassoc.com
1-800-203-5767 email: sales@reiterassoc.com

CIRCLE 797 ON READER SERVICE CARD

SLIP.NET PUT YOUR [illegible] ONLINE WITH!

WEB HOSTING $19.95 Per Month

- Unlimited E-mail Forwarding
- Domain Name Registration available (www.your company.com)
- 1000 MB of Data Transfer per Month
- 50 MB Storage for html Documents and Graphics
- Full Redundant T3
- Tons of Web Tools and Wizards
- Real Time Reporting on Web Site Activity
- Support for Custom CGI Scripts
- Support for MS FrontPage 97
- Self Directed Control Center
- Resellers Welcome

[illegible] Sites Served!

SLIP.NET

754-7638
1-800-SLIP.NET
Int'l: 415-536-6197
www.slip.net
Order OnLine!

@www. OR CIRCLE 794 ON READER SERVICE CARD

High performance web hosting at low performance prices

PLANS FROM $24.95 PER MONTH

(800) 339-HWAY
www.hway.net
(561) 989-8574

Hiway Technologies
THE WORLDWIDE LEADER IN WEB HOSTING

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

@www. OR CIRCLE 798 ON READER SERVICE CARD

602proINTERNET

- MAIL SERVER SMTP-POP3 GATEWAY
- LOCAL ENCRYPTED MAILBOXES
- FIREWALL/PROXY SERVER
- SUPPORTS MICROSOFT AND NETSCAPE BROWSERS

WWW.SOFTWARE602.COM/WIN.HTM

Acting as both a Firewall/Proxy Server and Mail/SMTP/POP3 Server, 602proINTERNET provides full internet connectivity to all of your network users so they can enjoy the benefits of having full Internet access including Web Browsing and E-Mail

Software602, Inc
6821 Southpoint drive North
Jacksonville, FL 32216
fax:904-296-2392
tel:904-296-2200
email info@software602.com

CIRCLE 795 ON READER SERVICE CARD

Is your business on the Internet? 1-800-749-1706

World Wide Web
Commercial Virtual Hosting Services

- **40 MB of disk space** for your html & graphics
  $0.50 per MB over 40 MB
- 500 MB Data transfer per month
  ($0.12 per MB over 500 MB)
- **FREE!** Support for custom CGI scripts
- Domain name registration with InterNIC
- **FREE!** Unlimited e-mail address forwarding
- Real-time web site statistics
- Full T3 to the Internet

IMC Interactive [illegible] Corporation

www.imconline.com
hosting@imconline.com

per month $24.95

COMING SOON! Support for web based chat, news, commerce, & personalization.

CIRCLE 799 ON READER SERVICE CARD

Rent Space Here

www.9netave.net

Web Hosting Sale!

FREE With Every Plan

- Fast UUnet access into the Major Internet Backbone
- Powered by SGI Origin 2000 Server
- Multi-homed, Internet connected data lines
- Microsoft FrontPage extensions
- Your own FTP site
- Your own CGI directory
- Web site activity logs
- Cold Fusion Support
- Account "Control Panel" accessed via WWW
- 99% uptime guaranteed

9NetOne Plan $14.95

Features:
- 25MB
- 6 mailboxes
- Domain name registration www.yourname.com
- Configurable, unlimited e-mail address forwarding
- Controllable Anonymous FTP

9NetPro Plan $39.95

Features:
- 100MB
- 25 mailboxes
- This special plan includes all features for 9NetOne Plan PLUS:
- Secure Server (SSL) access
- CyberCash®

9NETAVENUE

and get this absolutely FREE!

www.freeearth.net

WIN $1000

VISIT freeearth SITE FOR INFO!

OR CIRCLE 789 ON READER SERVICE CARD

PREMIER ZD Marketplace Shop www.marketplace.zdnet.com. Hundreds of ads, plus links to the web sites of @ www. advertisers.

Work Coast to Coast!

The First and Only Laptop Battery to Last Longer Than You Do

Announcing the 1-800-Batteries Portable Power Pack

- Ultra thin and lightweight
- Built in power gauge
- Works with any laptop
- $179.00

Call for our free product catalog

Batteries and Tools for Mobile Professionals™

1-800-Batteries
1-800-228-8374

save $2. order on the web www.800batteries.com

www. OR CIRCLE 551 ON READER SERVICE CARD

RIYC YOU NEED A COMPUTER

WE WANT TO SELL YOU ONE

Pentium/Cyrix/Multimedia Systems *from* $549 or LESS!
Pentium Class MMX/AMD Multimedia Systems *from* $699 or LESS!
Pentium Pro Multimedia Systems *from* $1099 or LESS!

We Will Beat Any Legitimate Dealer Pricing! Tell Us Where You Saw It Cheaper

Basic Multimedia Systems Include: Pentium Class Intel Vx/Hx/Tx MB w/512k pipeline burst • 16MB RAM • 2.1 GIG IDE Hard Drive • 1.44 Floppy Drive • 64-Bit 2MB SVGA Card

Your Choice: 8x4 CD-ROM Changer or 20x CD-ROM

• 16-Bit Sound Blaster-Compatible Sound Card • Win95 Keyboard • Microsoft-Compatible Mouse • Speakers • Mini-Tower Case w/230W Power Supply • 30-days Parts/Labor, One Year Parts Warranty

Please call for latest pricing and free catalog.

For the most up-to-date and accurate pricing see our website at
http://www.riyc.com—Lowest Prices on the Net!

Call 800·342·7991 Orders only!

718-325-0932 General Information 718-325-3141 24-Hour Fax Orders/info!

RIYC Computers Inc. • 1929 Edenwald Ave. Bronx, NY 10466 *Prices subject to change without notice

CIRCLE 552 ON READER SERVICE CARD

BASON HARD DRIVE WAREHOUSE 800-238-4453

Smaller than 2.0GB

100MB	Conner CP3100	SCSI	$45
540MB	Conner 3054S	SCSI	$119
510MB	Fujitsu 2624SA	SCSI	$119
540MB	Seagate 5660N	SCSI	$119
840MB	Seagate 3630A	IDE	$135
840MB	Seagate 3851A	IDE	$155
1.0GB	Quantum 31080S	SCSI	$209
1.0GB	Samsung 310820	SCSI	$159
1.0GB	Seagate 31010A	IDE	$149
1.0GB	Seagate 31055N	SCSI	$189
1.0GB	Seagate 51080N	SCSI	$189
1.0GB	WD 11000A	IDE	$159
1.2GB	Quantum 31280S	SCSI	$219
1.2GB	Seagate 31377A	IDE	$159
1.2GB	WD 21200A	IDE	$169
1.6GB	WD 21600A	IDE	$175
1.7GB	Quantum 31700A	IDE	$179
1.7GB	Seagate 31720A	IDE	$175

2.0 GB

IBM DCAS	Ultra	$329
Micropolis 4421AV	SCSI	$269
NEC 2100S	SCSI	$249
Quantum 32170S	SCSI	$299
Quantum 32160A	UIDE	$189
Quantum 32110S	Ultra	$239
Quantum 32210S	Ultra	$299
Seagate 32109N	SCSI	$359
Seagate 32107N	SCSI	$365
Seagate 32132A	IDE	$175
Seagate 32171N	Ultra	$409
Seagate 32151N	SCSI	$329
Seagate 32155N	Ultra	$349
Seagate 52160N	Ultra	$269
WD 22100A	IDE	$185

2.5 GB

Quantum 32580A	IDE	$195
Seagate 52520A	IDE	$189
WD AC22500	IDE	$199

3.0 GB

Quantum 33200A	IDE	$229
Quantum 33200S	SCSI	$299
Seagate 33240A	IDE	$219
WD 33100	IDE	$219

3.5 GB

Maxtor 83500A	IDE	$245
Quantum 33840A	IDE	$209

4.0 GB

Fujitsu 2954S	SCSI	$559
IBM DCAS	SCSI	$479
Micropolis 3243AV	SCSI	$559
Quantum GP34301	SCSI	$759
Quantum 34300	SCSI	$739
Quantum 34550S	SCSI	$659
Quantum 34320A	UIDE	$299
Seagate 15150N	SCSI	$659
Seagate 34371N	Ultra	$729
Seagate 14209N	Ultra	$799
Seagate 34501N	Ultra	$839
WD 34000A	IDE	$289

5.0 GB

Maxtor 85120A	IDE	$369

6.0 GB

Quantum 36480A	UIDE	$379
Quantum 36480S	SCSI	$499

9.0 GB

Fujitsu 2948SYU	SCSI	$899
Micropolis 1991	SCSI	$899
Micropolis 1991AV	SCSI	$899
Micropolis 3391S	SCSI	$999
Seagate 410900N	SCSI	$899
Seagate 19171N	SCSI	$1099

Hot-Swap Drives

Please call for other models

1.0GB	Seagate 31230WC	$289
2.0GB	Seagate 32171WC	$699
4.0GB	Seagate 15150WC	$999
9.0GB	Seagate 19171WC	$1389

Differential Drives

50-Pin

2.0GB	HP 3325D	$349
3.0GB	Seagate 32550ND	$559
4.0GB	Seagate 15150ND	$999

68-Pin

2.0GB	Seagate 32171WD	$799
4.0GB	Seagate 34371WD	$899
8.0GB	IBM 35250WD	$999
8.0GB	Seagate 410900WD	$1359

Controllers

Adaptec

1542CP		$165
2940 PCI UWide		$245
2940 PCI Ultra		$189

Tape Drives

QIC

3.2GB	IOMega 3200	$189
4.0GB	Conner 4000I	$349

DAT

2.0GB	Conner 2000Ext	$399
2.0GB	Conner CTD2004	$499
2.0GB	WangDat 3100	$499
2.0GB	HP 35470	$499
4.0GB	Conner 4324	$559
4.0GB	Conner CPT4004	$529
4.0GB	WangDat 3200	$599
4.0GB	HP 35480	$599
7.0GB	ExaByte 8205XL	$899
8.0GB	Conner 4326	$499
8.0GB	WangDat 3400	$659
8.0GB	HP 1533	$829
8.0GB	Conner CTD8000	$869
8.0GB	Sony 7000	$759
14.0GB	ExaByte 8505XL	$1759
16.0GB	Conner 4584	$999

Wide SCSI Drives

1.0GB	Conner 1080W	$189
1.0GB	IBM DFHS-W	$219
2.0GB	Quantum 3107WW	$219
2.0GB	Micropolis 4221W	$299
2.0GB	IBM DCAS-UW	$229
2.0GB	Quantum 32150W	$429
2.0GB	Quantum 32170W	$389
2.0GB	Seagate 32430W	$479
2.0GB	Seagate 32550W	$539
2.0GB	Seagate 32155-UW	$449
2.0GB	Seagate 32171W	$499
4.0GB	Fujitsu 2934QAW	$589
4.0GB	IBM DCAS-UW	$479
4.0GB	Quantum 34301W	$799
4.0GB	Quantum 34300W	$739
4.0GB	Quantum 34550W	$899
4.0GB	Seagate 15230W	$829
4.0GB	Seagate 15150W	$699
4.0GB	Seagate 34371-UW	$749
4.0GB	Seagate 34501-UW	$949
9.0GB	Fujitsu 2949QAW	$999
9.0GB	IBM 39100W	$999
9.0GB	Micropolis 1991W	$999
9.0GB	Micropolis 3391W	$1099
9.0GB	Seagate 410900W	$999
9.0GB	Seagate 19171-UW	$1199
23.0GB	Seagate 423451W	$2599

2.5GB IDE Seagate 52520A $189

8.0GB Tape Drive Seagate 4326 $499

2.5" Notebook Drives

SCSI

810MB	Toshiba MK1928FB	$379

IDE

520MB	Seagate 9646AG	$189
540MB	Seagate 9655AG	$189
640MB	IBM DRDA-2540	$189
810MB	IBM DVAA-2810	$189
810MB	Quantum 810EU	$189
810MB	Seagate 9616AG	$189
810MB	Toshiba MK1928FGV	$189
1.0GB	Fujitsu 2714TA	$199
1.0GB	IBM SAHADA 21000	$229
1.0GB	Toshiba MK1003MAV	$199
1.3GB	Seagate 91350A	$219
1.4GB	Toshiba 1403MAV	$229
1.6GB	Fujitsu 2724TA	$239
1.7GB	Toshiba 1701	$239
2.1GB	Toshiba 2101MAN	$279
2.1GB	IBM DTNA-22160	$329
2.1GB	Toshiba MK2103	$329
2.1GB	Toshiba 3003MAV	$409
3.0GB	IBM 23080	$409

- 30 day money back guarantee
- Same day shipping on most orders
- No surcharge for credit cards
- Please add $20 for internal drives
- Prices are subject to change without notice

Call: (818)727-9054 • Fax: (818)727-9086
E-Mail: basonwm@basoncomputer.com
http://www.basoncomputer.com

BASON MEMORY WAREHOUSE

Call us!
Or visit our Web Page for everyday new low prices!
800-400-9064

Standard 30-Pin SIMMs

4MB	4x3/4x9	$20/$30	

72-Pin DIMMs for Notebook

16MB	4x32	5.0V	$149
16MB	4x32	3.3V	$185

Standard 72-Pin SIMMs

4MB	1x32/36	$19/ $25
8MB	2x32/36	$33/ $49
16MB	4x32/36	$59/ $75
32MB	8x32/36	$119/$145

EDO 72-Pin SIMMs

4MB	1x32	$19
8MB	2x32	$33
16MB	4x32	$59
32MB	8x32	$119

www. OR CIRCLE 553 ON READER SERVICE CARD

Highest Quality Best Pricing

THE UPGRADE GROUP 800-718-7888 714-380-4845

University
Government
Corporate
P.O.'s accepted

Kingston TECHNOLOGY

www.upgradegroup.com

www. OR CIRCLE 554 ON READER SERVICE CARD

1•800•4 MEMORY

MEMORY

SELL•BUY•TRADE

WE CAN **BEAT** ANY QUOTED PRICE IN THIS MAGAZINE FOR MEMORY!!!

- Lifetime Warranty
- No Credit Card Surcharge
- No Restocking Fee

CALL AROUND THEN CALL US!!!

HTTP://18004MEMORY.COM

CIRCLE 555 ON READER SERVICE CARD

CIRCLE 556 ON READER SERVICE CARD

SAMSUNG • MAGNAVOX • AMD • INTEL • APC • DIAMOND • PHILIPS

SEAGATE • CARDINAL • LEXMARK • 3COM

U.S. ROBOTICS • KINGSTON • OKIDATA

Ralin is your BEST SOURCE for Computer Parts & Systems

Specializing in CORPORATE, EDUCATIONAL & GOVERNMENT Business

CAN'T FIND IT? CALL US!

OUR JOB is to make YOUR JOB EASIER!

Motherboards • Memory • Networking • Notebooks • Cases • Power Protection • Hard Drives
CD-ROM Drives • Monitors • Video Cards • Printers • Scanners • Tape Back-Ups • Modems

SAMPLE PRICES

PLEXTOR 12x SCSI CD-ROM $299
PHILIPS 15" Multimedia Monitor $329
SAMSUNG 1.6 Gig Hard Drive $189
PRACTICAL PERIPHERALS 33.6 int $116

- OVER 10 YEARS IN BUSINESS
- CUSTOM CONFIGURATIONS
- MAJOR BRAND NAMES
- SAME DAY SHIPPING
- 30 DAY GUARANTEE
- FACTORY DIRECT

5% OFF Most Orders*

CALL NOW FOR COMPLETE PRICE LIST

WE ACCEPT CREDIT CARDS

1-800-752-9512

Ralin WHOLESALERS, INC.
Buffalo, NY 14127
Fax: 716-825-9641

* MUST MEET MINIMUM PURCHASE REQUIREMENT

ADAPTEC • ATI • CREATIVE LABS • HAYES • NEC • DAYTEK • EPSON

CIRCLE 557 ON READER SERVICE CARD

MMX Deals

Motherboard w/512K and Intel Pentium + Cooling Fan
166Mhz - US$ 270
200Mhz - US$ 390
233Mhz - US$ 441
Add a Case to any of the above for US$ 40.00 More

We are an Intel Processor Dealer

CPUs	100	133	166	200	233
Pentium	$91	$114	$148	$229	N/A
MMX	N/A	N/A	$167	$295	$441
AMD K5	$64	$77	N/A	$104	N/A
AMD K6	N/A	N/A	$168	$230	$363

Pentium II 233 MHz $ 636 - 266MHz $851

Motherboards

Triton 430VX for Pentium MMX - AMD K5/K6 $85
Triton 430TX for Pentium MMX - AMD K5/K6 $115
Intel PD440FX for Pentium II $254
Intel PD440FXNA for Pentium II $236

Video

Trident 9680 1MB $30 S3 Virge 4MB PCI $60

DLP Computers
800-241-2093
www.dlpcomputers.com
Prices subject to change w/o notice

CIRCLE 559 ON READER SERVICE CARD

LIFETIME WARRANTY **MEMORY** LIFETIME WARRANTY

30PIN SIMMS

1MB	$14
4MB	$29

72PIN NON PARITY

4MB	$20
8MB	$39
16MB	$84
32MB	$172

72PIN EDO

8MB	$46
16MB	$82
32MB	$179

NOTEBOOK MEMORY

AST
Ascenta J Series
8/16/32MB $69/135/245

COMPAQ
LTE 5000
8/16/32MB $74/139/249
Presario 1020 1030 1080
8/16/32MB $69/135/269
Armada 1100 1120,1130
8/16/32MB $75/135/259

FUJITSU
Milan, Lifebook 520
8/16/32MB $75/135/269

IBM
Thinkpad 355,360 Series
8/16MB $89/159
Thinkpad 760EX ED 365X XD
8/16/32MB $75/139/279

SHARP
PC 9000,9030
8/16/32MB $89/149/279

TOSHIBA
Satellite Pro 400,415 100,105CS
8/16/32MB $79/145/249
Tecra 710 CDT 720 730
8/16/32MB $79/139/249

WE SPECIALIZE IN NOTEBOOK MEMORY

eritech 1-888-808-6242
Phone: 818-244-6242 • Fax: 818-500-7699
http://www.eritech.com

Prices subject to change
Most items are shipped the same day

4551 San Fernando Road • Suite 110, Glendale, CA 91204 • email: eritech@spry.net.com

@www. OR CIRCLE 558 ON READER SERVICE CARD

UPGRADE FESTIVAL!

UPGRADE KITS - IT'S A BRAND NEW PC
WITH ALL THE SAME COMPONENTS
ALL ASSEMBLED & TESTED
(JUST ADD $20 FOR S/H)

INTEL 100MHZ KIT ($399)	INTEL PRO 150 KIT ($599)
1) INTEL 100MHZ CPU	1) INTEL PRO 150 CPU
2) INTEL VX MB 512PLC	2) INTEL 440FX MB 512K
3) FAST 16MB 80NS EDO	3) FAST 32MB 60NSEDO
4) FAST PCI 4+ VGA 2MB	4) STEALTH 64 3D 4MB
5) 4EIDE 2FD 1EPP 2HS	5) 4EIDE 2FD 1EPP 2HS
6) CASE 230W 5 BAYS	6) CASE 230W 5 BAYS
INTEL 120 KIT ADD $10	INTEL PRO 166 ($799)
INTEL 133 KIT ADD $30	INTEL PRO 180 ($899)
INTEL 150 KIT ADD $60	INTEL PRO 200 ($999)
INTEL 166 KIT ADD $80	AMD K6 166+ KIT ($499)
CYRIX 6X86 166+ ($449)	1) AMD K6 166+ CPU
1) INTEL 166 MMX CPU	2) INTEL TX MB 512 PLC
2) INTEL VX MB 512 PLC	3) 32MB 60NSEDO 72PIN
3) 32MB 60NSEDO 72PIN	4) STEALTH 64 3D 4MB
4) STEALTH 64 3D 4MB	5) 4EIDE 2FD 1EPP 2HS
5) 4EIDE 2FD 1EPP 2HS	6) CASE 230W 5 BAYS
6) CASE 230W 5 BAYS	AMD K6 200+ KIT ($799)
AMD K5 166+ KIT ($489)	AMD K6 233+ KIT ($999)
CYRIX 6X86 200 KIT ($599)	INTEL 233 MMX KIT (CALL)
INTEL 200MHZ KIT ($899)	INTEL P II 233KIT (CALL)
INTEL 166MHZ KIT ($699)	INTEL P II 266KIT (CALL)
INTEL 200MHZ KIT ($799)	CYRIX M2 KIT'S (CALL)

WHY BUY A NEW PC EVER AGAIN?

You all by have a PC with floppy drive, hard drive, monitor, keyboard, mouse + CD-ROM, sound card, and modem. So why buy a PC again? Any IBM 386 486 586 (even brand-names like IBM, Compaq, NEC, Dell, Gateway - impossible to upgrade due to proprietary designs) is upgradable if you use our Upgrade PC. It's a brand new PC equipped with core components you need to run Win95 & NT. Just move other components over and you have a brand new PC at a fraction!

WE CARRY EVERYTHING - CALL FOR CPU, MB, RAM, VGA, HD, SND, CD ROM, MODEM, MS + 100'S MORE!

MOTHERBOARDS, ETC.™

To Order (800) 395-8718 (209) 969-6060
VISA MASTER AMEX DISCOVER / UPS FEDEX
VISIT US @ WWW.MOTHERBOARDSETC.COM

CIRCLE 560 ON READER SERVICE CARD

Computer Upgrades.Net

MBOARD 512k &200*+=$169

MEMORY		CPU	
4MB	$16	P166mmx	$149
8MB	$29	M2 200	$209
16MB	$56	K6 200*	$219
32MB	$109	K6 233	$329

SD RAM 16/32/64-$69/$139/$299
PII 233/266 $499/$739
P200/233 $429/$239

INTEL···*CYRIX···AMD

MASSIVE STORAGE

1.20	$149	2.10	$169
1.60	$179	2.50	$199

TX Mb 512K - $79
M BOARD·V CARDS MODEMS·CD·ETC

MIAMI INT'L FAX (305) 436 - 0926
9300 NW 25 St Suite110
MIAMI, FLORIDA 33172
M - F 9am - 8pm SAT 12pm - 5pm EST
1-800-621-8309
VISA · MC · AMEX · DISCOVER· WE EXPORT
PRICES SUBJECT TO CHANGE

@www. OR CIRCLE 561 ON READER SERVICE CARD

Save more when ordering online
WWW.MICROSHACK.COM

Complete CD-Recording Kit

6X Read
2X Write

$369

1 Year Warranty

- Internal JVC CD-R Drive
- SCSI-2 Controller Card & Software
- CD-R Mastering software for Win 3.1, Win 95, NT, OS/2 Warp and Mac
- 1 Blank CD-R Media
- Data Cables & Mounting Screws
- Installation Guide

Blank CD-R media $3.99

Internet Color Digital Camera

Motion & Still Image Capabilities

$159

Video Conferencing Over the Internet

- No Video Capturing Card Needed
- Plugs into any Parallel Port
- No Power Adaptor Needed
- 16.8 Million True Color and 256 Grayscale
- Supports JPEG, BMP, GIF, PCX, TGA, TIF
- Supports MS Netmeeting
- 1 Year Warranty and Support

200 MMX System-Loaded

$999

. Intel 200 MMX CPU
. 32 MB EDO RAM
. 2.1 GB Hard Disk Drive
. 24X CD-ROM Drive
. SVGA w/2MB
. 16-bit Sound Card
. 56K Fax/Modem/Voice
. Keyboard, Mouse, Speakers
. Loaded with Software (Win 95, MS Works, MS Money, MS Encarta 97 and more)

Options:
- 17" Monitor .28 (Add $449)
- 15" Monitor .28 (Add $229)
- 4.0 GB Hard Disk Drive (Add $99)
- Office 97 Professional Full Ver (Add $119)

Same System As Above with AMD K6 MMX CPU

$949

Flatbed Color Scanner

11 Office & Studio Software Included

$149

- Single-Pass
- Up to 4800 dpi Resolution
- 24-bit color & 8-bit Grayscale
- 8.5" x 11.7" Scan Window
- 11 Award Winning Software included (Scantastic)

- Western Digital Caviar 4.0 GB HDD $279.00
- Quantum Bigfoot 5.25" 6.4 GB HDD $369.00

Best Value

MicroShack Corp.
1-888-99-SHACK
(810) 726 5474 Fax (810) 726 5538
Visit our WEB site for the latest specials & prices
WWW.MICROSHACK.COM
email: salesinfo@microshack.com
[illegible] Van Dyke Suite 170 Sterling Hts, MI 48314
Prices subject to change without notice

www. OR CIRCLE 583 ON READER SERVICE CARD

DATA NETWORKS/PC'S/UPGRADES
MODEMS/PHONES/VOICEMAIL/FAX
WEB CATALOG www.bluecomm.com

COMMUNICATIONS
- Modems — World's Largest Selection from A to Z ISDN/56K/33.6/14.4/2400 All Makes & Models from $49
- MultiPort I/O by DigiLava/Control Equinox/Boca
- Routers/Bridges Cisco/Ascend/Livingston/Motorola
- DSU/CSU's for Digital & T1 Circuits w/Frame Relay
- Multiplexers — Data & Voice by Micom/Multitech
- Network Cards 3 Com/SMC/Etc from $29

COMPUTERS
- Pentium 133/166 | 2GB 16MB | 4 Mon from $995
- Pentium Pro 200 | 2GB 32MB SCSI | 4 Mon from $2395
  IBM/Compaq/HP/Toshiba/NEC/AST & More
- Notebooks 1000's in Local Stock — All brands & models
- Memory & CPU's for all Computers $CALL
- Custom PC's/Barebone & Servers RESELLERS WANTED

COMPUTER TELEPHONY & ACCESSORIES
- Voice Mail Systems 2 - 8 Ports or more from $595
  Telemarketing/Dating/Call Back & Debit Card Systems
- Multiline Phone Systems for office or home $CALL
- Phones for Business, Decorator & Novelty
- Fax/Phone & Caller ID Switches & Routers $CALL
- Mobile Comm Accessories for the Road Warrior
- Cellular Accessories Batteries & More

BLUE LINE COMMUNICATIONS WAREHOUSE, INC
805 W. Barrett Anaheim, CA 92805
800-258-7810
714-999-2441
Fax 714-999-2442

www. OR CIRCLE 582 ON READER SERVICE CARD

MBS COMPUTERS Micro Business Systems Inc.
#110, 7110 - 120th Street, Surrey, B.C., V3W 3M8
Tel: (604) 572-8722 Fax: (604) 572 9666

IBM Compatible Computer Systems
Custom built to your own SPECIFICATIONS

You simply choose what you want, we will build, configure and install it for you

What you want is what you get!

Committed to quality.....Focused on price.

MOTHERBOARDS	KEYBOARDS
VGA CARDS	MOUSE & GLIDE PADS
SCSI CONTROLLERS	SOUND-CARDS
CPU & RAM	PRINTERS
NOTEBOOK RAM	DIGITAL CAMERAS
HARD DRIVES	CASES
FLOPPY DRIVES	SOFTWARE
CD ROM DRIVES	GAMES
FAX-MACHINES	.....and much more!
FAX-MODEMS	

#110, 7110 - 120th Street, Surrey, B.C., V3W 3M8 **Tel: (604) 572-8722 Fax: (604) 572 9666**

For further information visit our WEB site
www.microbiz.net or e-mail us at sales@microbiz.net

CIRCLE 564 ON READER SERVICE CARD

HiQ YOUR COMPUTING SOLUTIONS PARTNER
Corporate, Government, and Educational POs Welcome

HiQ K6-PR200
AMD K6-PR200 MHz

AMD

- Intel 430TX Chipset
- PC Power & Cooling Heat Sink
- 16MB EDO RAM
- 1.44MB Floppy Drive
- 1.7GB EIDE Hard Drive
- Matrox Mystique 2MB SGRAM Video
- 12X CD-ROM Drive
- Soundblaster 16 Sound Card
- Windows 96 CD-ROM Version
- Office Professional 97 CD-ROM
- ATX Mid Tower Case
- Labtec CS800 Speakers
- 104 Keytronics PS/2 Keyboard
- Microsoft PS/2 Serial Mouse
- 15" Panasonic S15 Monitor
- HiQ Warranty: Three Year Parts, One Year Labor

$1439

UPGRADES
Upgrade to 32MB EDO RAM.....$79
Upgrade to 17" Panasonic S17 .....$249
Include US Robotics 33.6 Fax/Modem $99

CALL FOR LATEST PRICING!

Next Day Shipment on Advertised Systems*

1.800.827.5836

www.hiq.com

3 Year Limited Warranty

LOCATIONS NATIONWIDE	SAN ANSELMO, CA 800.929.1893	BOSTON, MA 800.249.1886	DENVER, CO 303.338.1300
SUNNYVALE, CA 800.827.5836	ATLANTA, GA 800.875.2882	CHICAGO, ILL 800.819.4588	SACRAMENTO, CA 916.635.7842

HIQ

[illegible] all rights reserved

CIRCLE 585 ON READER SERVICE CARD

INTELLIGENT PENTIUM EXPLORE SYSTEM

- Intel® III Motherboard System w/ 120 MHz CPU
- 16 MB 60ns EDO memory
- US Robotics Sportster 56k internal Winmodem
- 12X Toshiba CD-ROM Drive
- 2.5 GB WD EIDE Hard Disk Drive
- 1.44 MB Teac Floppy Drive
- 3D Graphics Card 2MB
- Mini tower case w/ Display
- Mouse & Pad
- Win95 keyboard — $799
- Pentium 200/166/150/133 — $969/$899/$859/$839
- MMX P-200/166 — $1,259/989
- INTEL 233/266 — $CALL$

We provide ethernet as low as $17 a month
Upgrades & Services Available

Call for the best prices on more Systems, Motherboards, Cases, CPU's, Hard Drives, Memory, Monitors, Printers & Software

800-714-4371

2 BG COMPUTER

3060 Scott Blvd • Santa Clara CA 95054
408-988-2968 Fax 408-988-2686
Http://www.infinex.com/~ilbgcom
Email 2bgcom@infinex.com
Business Hours M-F 9-6 Sat 10-5 PST

www. OR CIRCLE 586 ON READER SERVICE CARD

Rite-Way Computers

Don't Kill It Upgrade It!!

We Carry Bare Bones Kits, Hard Drives, Memory, Video Cards, Modems, And Much Much More!!
Visa / Mastercard / Discover
No Surcharge!
Call for Latest Pricing
360-240-0981

Visit Our Web site
www.rwcomputers.com

www. OR CIRCLE 587 ON READER SERVICE CARD

Best Price/Performance Solutions

Undecoded Wand	$39.00
Wedge/Serial Decoder	$89.00
Undecoded CCD	$109.00
Keyboard Wedge CCD	$129.00
Undecoded Slot Reader	$89.00
Keyboard Wedge Slot Reader	$139.00
Undecoded Magstripe Reader	$39.00
Kbd Wedge Magstripe Reader	$129.00
59-Key Programmable Kbd	$99.00
LCD Customer Display (20x2)	$129.00
Serial Cash Drawer	$129.00
Undecoded Laser Scanner	$229.00
Kbd Wedge Laser Scanner	$259.00

30 Day Money Back Guarantee
Same Day Shipping
Free Technical Support
Dealer Discount Available

FAMETECH AMERICA, INC.
Tel: (512) 331-4656 Fax: (512) 331-7810
E-mail: tysso@aol.com (800)TYSSO-ID
Internet: http://members.aol.com/tysso

CIRCLE 588 ON READER SERVICE CARD

Special Dealer/VAR Discounts Available!

Portable Readers
- Operates on one 9-volt battery
- 54-key alpha/numeric keyboard
- Date and time stamps
- Auto power off with resume
- Incorporates American Microsystems' industry-leading decoding algorithm

Wand Packages
- Including decoder & cables
- Rugged construction
- Lowest cost input device
- Extremely high first read rates

30-day No Risk Guarantee!

Laser Packages
- Including decoder & cables
- Extremely fast and accurate
- Ergonomically designed
- Very rugged and durable
- Even reads poorly printed bar codes

The Power to be Efficient.

CCD Packages
- Including decoder & cables
- Very fast and accurate
- No moving parts to break
- Completely solid state
- Ergonomic design
- Very rugged and durable
- Less expensive than lasers

Label Design Software
- Full range of bar code capabilities
- Very easy to use
- Full featured label design software for Windows
- Scalable fonts
- Rotatable text and graphics
- Floating color and tool bars

Lifetime Toll-Free SUPPORT!

Omnidirectional Laser Packages

NEW!

Mag Stripe Packages
- Includes decoder & cables

CALL NOW FOR A FREE CATALOG!

AMERICAN MICROSYSTEMS, LTD

phone 817 571 9015 • fax 817 685 6232
2190 Regal Parkway • Euless, Texas 76040

800 648 4452 WWW.AMLTD.COM

13 years in business • 30-Day money back guarantee • Same-day shipping

www.

Bar Code Headquarters

Labeling Software
For LaserJet, DeskJet, etc.

For Windows and DOS!

- Any Format, Any Label. WYSIWYG Design
- **Formats for Sears, K-Mart, Penney's, WalMart, TCIF, Logmars, EIA, AIAG, etc.**
- Prints Bar Codes: UCC/EAN-128, Code 128, UPC/EAN, 2 of 5, MSI, Codabar, Code 39
- Simple Custom Operator Interface
- LabelRIGHT™ for Windows™ – **$295**
- LabelRIGHT™ for DOS – **$279**

Bar Code Fonts for Windows™

- Insert bar codes into any font based Windows program by Clipboard or Hot Key.
- Prints UPC/EAN, UCC-128, Code 128, Codabar, Code 39, Interleaved 2 of 5
- For dot-matrix and laser printers – **$199**

Bar Code Readers
for IBM PC, Mac and RS-232 Terminals

- Attaches as Second Keyboard
- Add Bar Code Reading to any Software
- For Windows, DOS, Novell, UNIX, Mac OS
- Code 39, UPC/EAN, 128, 2 of 5, Codabar, 93
- Wand, Magstripe, CCD, Slot Badge or Laser
- **Top Rated by Independent Reviews**
- Complete Reader with Wand only – **$299**
- Cordless "Laser-Like" CCD Scanner – **$599**
- Complete Integrated Laser Scanner – **$649**

Portable Bar Code Readers
for IBM PC, Macintosh, and Serial Interface Computers

With Voice!

- Battery Operated Batch Data Collector
- 64K or 256K Data Storage
- Display messages & voice messages prompt operator.
- Pick lists, tables.
- Wand, CCD or Laser Scanner
- Code 39, UPC/EAN, 93, 128, Codabar, etc.
- **Very Easy to Create Custom Prompts**
- Small Size-Weighs only 12.5 oz.
- 64K Complete with Wand & Voice – **$759**
- 64K unit with Integrated Laser– **$1299**

2-Way Radio Reader

- Scan and Key Data On-line with Portable Wireless Reader
- Computer Sends Display and Voice Messages
- 1,000 Ft. Range from Base
- Bar Code Input by Wand, Laser or CCD
- 6.3" x 3.3" x 1.25", 14 oz.
- Base Station – **$845**
- Complete Terminal with Wand Scanner – **$1215**
- With Integrated Laser Scanner – **$1790**

We're not Just a Dealer!

WE'RE THE MANUFACTURER, SO YOU GET:

– Better pre-sale Advice on a *Full Selection of Solutions* of Simple wedge to Portable Batch to RF Wireless plus Bar Code Software
– Better post-sale Support
– 24 hour Turnaround on Repairs

Ordering is Easy! 1-800-345-4220

- Made in the USA
- "800" Tech Support
- 30 Day $ Back Guarantee
- Qualified P.O's Accepted
- 2 Year Warranty on Readers
- Same Day Shipping
- Free UPS Blue in US
- Direct from the Manufacturer

WORTHINGTON DATA SOLUTIONS

CALL FOR FREE CATALOG AND BAR CODE PRIMER!

Europe Phone: (353) 1 6614 566 • Fax: (353) 1 6614 622 • *USA* Phone: 408-458-9938 • Fax: 408-458-9964 • Web: www.barcodehq.com

@www.

PORTABLE PRODUCTS

YOUR COMPLETE SOURCE FOR BAR CODE AND HANDHELD DATA COLLECTION SYSTEMS

- BARCODE READERS – Keyboard wedge, RS-232, PC, Mac, Most data terminal interfaces
- INPUT DEVICES – Laser, CCD, Wand, Slot, Magstripe – All available with built-in decoder
- PORTABLE HANDHELD READERS – DOS & Windows Application Generators – No programming experience needed. Develop your application in minutes.
- Printers, Verifiers, Label Software, Labels, Plug-N-Play RF Systems, Wireless PDA's

FREE UNLIMITED 800 TECH SUPPORT
UNCONDITIONAL SATISFACTION GUARANTEE
CALL FOR FREE CATALOG

1-800-849-0958

http://www.portableproducts.com

PORTABLE PRODUCTS

8401-K Mayland Drive • Richmond, VA 23294
phone 804-346-0111 • fax 804-346-0196

CIRCLE 569 ON READER SERVICE CARD

All Your Bar Code Needs

- Best Prices
- Volume Discounts
- Your Own Free Technical Consultant
- Toll Free Technical Support
- Same Day Shipping
- 30-Day No Hassle Money Back Guarantee

Free 100 Page Catalog

www.systemid.com
800•397•9783
972•516•1100

SYSTEM ID

CIRCLE 570 ON READER SERVICE CARD

Mouse Pads

Custom Printed
- Your Logo Design
- Fast Turnaround
- Guaranteed Quality

Plastic

Cloth

MicroStore™
800-962-8885
FAX: 507-665-2604
LE SUEUR, MN 56058

Wrist Supports

CIRCLE 571 ON READER SERVICE CARD

Computer Solutions

- APC Power Protection Equipment
- Toshiba notebook computers
- Cisco Networking Gear
- Compaq Servers
- HP Printers

Please visit our website:
http://www.msei.com
for
state of the art technology at down to earth prices
Please call **(800) 535-5454**
for a quick, competitive price quote.

e-mail : sales@msei.com

M. S. Enterprises, Inc.

FAX: (508) 537-1326

www. OR CIRCLE 574 ON READER SERVICE CARD

GUARANTEED SUCCESS!

- Earn $500 TO $2000 per week!
- Guaranteed Profits in Writing!
- LOW Start-up
- Not Multi-Level
- Full or Part Time
- Limited Offer!!
- CALL NOW!!

inet INTERNATIONAL (888) 327-4664

www. OR CIRCLE 575 ON READER SERVICE CARD

ONE STOP BAR CODE

symbol CERTIFIED VAR

free! Guide to Bar Coding CALL NOW!

Bar Code Scanners

Portable Data Terminals

Bar Code Printers/Media

Great Prices PLUS Total System Support

Software Solutions

StrandWare Bar Code Printing Software

Monarch Marking Systems

DATA RECOGNITION INC.

www.datarecognition.com

512-349-6201 fax

sales@dri.com

2929 Longhorn Blvd., Suite 103
Austin, TX 78758-7628

Resellers Welcome

Same-day shipping* of in-stock products from Symbol Technologies, Monarch, StrandWare and all major manufacturers.

Easy to Order • Call 800-541-9645

*ORDER BY 3 P.M. CST

www. OR CIRCLE 572 ON READER SERVICE CARD

International Technologies & Systems is a complete solutions provider and long-term partner to industry, government and retail.

GSA Listed

Magnetic Stripe Readers from **$79**

Portable Data Collectors from **$499**

Wand, CCD & Laser
Complete Scanning Solutions from **$99**

CALL TODAY!
EAST 800-826-1688
WEST 800-228-9487
+1-714-990-1880

12th Anniversary

Quick Set-up • No-Risk Policy • Free Technical Support • Same Day Shipping

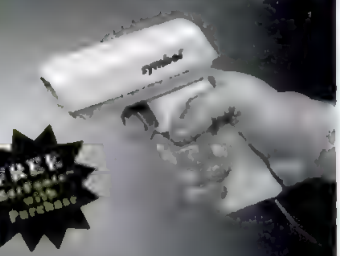
CIRCLE 576 ON READER SERVICE CARD

Barcoding just got a lot easier...

SOFTWARE SUPPORT
CUSTOM SOLUTIONS
POS PERIPHERALS
SERVICE & REPAIR

Keyboard Wedge Solution

- Hand
- 60mm or 80mm CCD special price $139
- Hewlett Packard Wand Reader $119



FREE Software with Purchase

DATAVISION Offices Nationwide

1-800-375-9063
215-396-0308
www.data-vision.com

Call For Our Free Catalog

www. OR CIRCLE 573 ON READER SERVICE CARD

Hundreds of Barcode Products & Great Customer Service!

BarCode DISCOUNT WAREHOUSE, INC.

Will Beat *Any* Advertised Prices for Comparable Merchandise

Star SP212FC/FD Receipt Printer $235
Cash Drawer and Receipt Printer Combos Available

Metrologic 951/47 Laser Scanner $269 5+ Units..... $259
- With built-in decoder
- Includes AT & PS/2 cables

CCD Scanner $175
- Built-in decoder
- Includes AT or PS/2 cable

PSC Quickscan 6000	$395	EZBarcode SerialWand	$149
Metrologic MS6720/47	$895	MMF ECD200 Cash Drawer	$180
Percon PT2000/128K	$595	Star SP312FC/FD	$445

Call for a FREE Catalog! 1-800-888-2239

VISA MasterCard AMERICAN EXPRESS

Phone: (216) 582-1144 • Fax: (216) 582-1177
e-mail: bcdw@coil.com • Internet: www.bcdw.com
9841 York Alpha Dr.-Unit C, North Royalton, OH 44133

CIRCLE 577 ON READER SERVICE CARD

When you're serious about Order Entry Get Serious With

MailOrderManager

If you're a cataloger, retailer, wholesaler, distributor—anyone selling products or services by phone, mail, or even the World Wide Web—get complete control of your business with M.O.M. With M.O.M. you only need one program on your PC or PC Network to run your entire business—order entry, credit card processing, inventory, purchasing, contact management, shipping, mailing list management, accounting and reporting.

1-800-858-3666
http://www.MailOrderCentral.com

Dydacomp Development Corp
150 River Road, Suite N-1 Montville, NJ 07045

CIRCLE 581 ON READER SERVICE CARD

Home Study
ACCREDITED B.S. DEGREE in Computer Science

Easy-to-study lessons in Multimedia, C, C++, Windows 95, Java, Visual Basic, Networks, Unix, Database Design, Software Design, & many more lead to the only home-study BSCS degree accredited by an agency recognized by the U.S. Department of Education.

Professional software & hardware provided at no extra charge. Programs in Computer & Electronics Engineering Technology as well. All accredited by the Distance Education and Training Council and VA approved. Our 47th year.

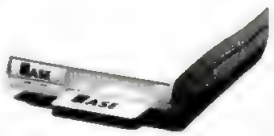
Free Catalog: 1 (800) 955-2527

GRANTHAM College of Engineering

Grantham College Rd., Slidell, LA 70469-5700

Gain Access To The World Of Smart Cards

Want to develop PC-based smart card applications? **ASE® - The Aladdin Smartcard Environment** is the solution you need! ASE is a complete package containing ASE*Drive*, a versatile read/write drive; ASE*Soft* interfaces, utilities and samples; and ASE*Card* memory and CPU cards. ASE's strengths include ease-of-use, flexibility and security! ASE is ideal for developing a range of applications, including electronic commerce, access control, authentication and more. **Make the most of this exciting technology. Order your low-cost ASE Developer's Kit today!**



1-800-562-2543
www.aks.com
ALADDIN KNOWLEDGE SYSTEMS INC

Aladdin Knowledge Systems Inc.
Tel 800 562-2543, 847 808-0300
Fax 847 808-0313
Email ase sales@us.aks.com

CIRCLE 578 ON READER SERVICE CARD

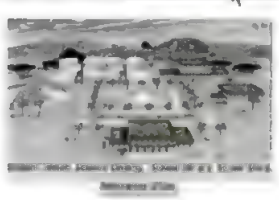
MICR Check Software $99

- Windows 95/3X
- Unlimited bank & company accounts
- **FREE** 30 day trial—download from **http://printerm.com**
- MICR Tester, Toner, Check Security Bond Paper

PRINTERM DATASCRIBE, INC.
300 Pearl St., Buffalo, NY 14202
716-842-3099
Fax 716-842-6049

CIRCLE 582 ON READER SERVICE CARD

ADDRESS FOR SUCCESS
http://www.aics.edu



- Earn B.S. and M.S. in Computer Science
- DISTANCE EDUCATION
- Object oriented B.S. program
- New courses in Java, Networking, HTML, MIS
- Approved by more than 275 companies
- Follows ACM/IEEE guidelines

AMERICAN INSTITUTE COMPUTER SCIENCES

ACCREDITED MEMBER World Association of Universities and Colleges

Free catalogue
1-800-767-AICS *or*
http://www.aics.edu

STOP *Don't buy any accounting software before you see our program !*

- Order Processing
- Inventory Control
- Point of Sale
- Accounts Receivable
- Accounts Payable
- Shipping Labels
- Profit Analysis
- Credit Card Processing
- Transaction Security
- XBase Compatible

STORM+E.O. Fully Integrated Management & Accounting System

- Purchase Order
- CRM Management
- Sales & Training
- Service Scheduling
- Purchase Order
- Multiple
- RMAs
- Bank Orders
- Inventory Planning
- Barcode Printing
- Multi Tier Sales Tax
- E-Mail Client
- Contact Management
- Application Integrity
- Telephone
- Management

770.447.6257

CIRCLE 579 ON READER SERVICE CARD

DVD MPEG

1-888-dvdmpeg (383-6734)
www.dvdmpeg.com

- VCD & DVD TITLES FROM $15.88
- 2-4 FREE CDS WITH DVD PLAYERS
- DVD UPGRADE KITS • MPEG CARDS
- SVGA + TV TUNER COMBO CARDS
- PC TO TV CONVERTER • TV TUNERS

9430 Warner #M, Fountain Valley, CA 92708
Call 714 378 3167 Fax 714 378 3171

CIRCLE 580 ON READER SERVICE CARD

FREE PHONE SUPPORT *for* WINDOWS NT

a complete listing and current prices
Call for Quantity and MOLP Discounts

Microsoft

Microsoft BackOffice 2.5	$2279
NT 4.0 Resource Kit	WS-$54/SRV-$109
Windows NT Training Kit	$137
NT 4.0 Upg $39	Both $169
Windows NT 4.0 Server w 5 Client Access	$749
Windows NT 4.0 Server w 10 Client Access	$1039
Windows NT 4.0 - 20 Client Access License	$609
Windows NT 4.0 - Single Client Access Lic.	$36
Upgrade to NT 4.0 Server w 5 Client Access	$375
Upgrade to NT 4.0 Server w 10 Client Access	$495
Upgrade Windows NT 4.0 - Single Client Lic.	$18
Upgrade Windows NT 4.0 - 20 Client License	$305
Windows NT 4.0 Workstation (CD)	$294
Windows NT 4.0 Workstation License	$249
Upgrade to NT 4.0 Workstation from NT 3.x	$135

JSI, Inc. 800-585-9588 770-475-3820
Fax 770-442-3820
1045 Essex Court
Alpharetta, GA 30201-3811
Email jsi@cls.compuserve.com

CIRCLE 584 ON READER SERVICE CARD

CALLING CARDS
A Multi-Billion-Dollar Industry

More money will be made in value added long distance resale than any other single area in American business today!

Start Your Own Phone Company

Point 2 Point - PC Platforms

- 24 to 1200 Lines
- Rackmount PCs
- Calling Cards
- Dialogic SCSA
- Intl Call-Back
- Windows NT

No-Interest Financing

Only $10 000 down and $995/mo

Resale Cards

Cards From 13/Min
PINs From 12/Min
Great Intl Call-Back Rates
Custom Cards and Promotions

Call today to receive a FREE calling card and our informative book, How To Cash In On The Calling Card Industry!

RCP COMMUNICATIONS FAX 800-276-8605

800-845-2716
www.debit-cards.com

@www. OR
CIRCLE 583 ON READER SERVICE CARD

@www. OR CIRCLE 585 ON READER SERVICE CARD

Sentinel is the #1 Solution to Piracy

Piracy is the greatest threat to the success of your software business. Today, the Internet and CD-ROMs make your software more vulnerable to piracy than ever before.

Stop piracy and ensure your revenue with Sentinel, the world's leading protection. Over 25,000 developers have relied on more than 11 million Sentinels to protect their software.

Call one of our security specialists today to order a ***Sentinel Developers Kit*** and receive your FREE guide: ***How to stop piracy and increase your software sales.***

800-705-5552
www.rainbow.com/dkit

SENTINEL
Software Protection
The #1 solution to piracy

RAINBOW TECHNOLOGIES TEL: (714) 450-7300 • FAX: (714) 450-7450 • EMAIL: sentinel@rainbow.com • FRANCE: (33) 1 41 43 29 00 • GERMANY: (49) 89 32 17 98 0 • U.K.: (44) 1932 579200
©1997 Rainbow Technologies, Inc. Sentinel is a registered trademark of Rainbow Technologies *Distributors located worldwide, call or visit our web site for a complete listing.*

@www. OR CIRCLE 586 ON READER SERVICE CARD

KEY-LOK™
Piracy Prevention

- ☐ 15 years effective prevention
- ☐ Very easy to implement
- ☐ Algorithmic response
- ☐ Programmable memory
- ☐ Remote update - Free
- ☐ Counters & Lease Control
- ☐ Multiproduct licensing
- ☐ Network Support
- ☐ DOS/WIN3.x/WIN95/WINNT
- ☐ Tech support 7 by 24 (800)
- ☐ **$14/1,000, $16/10, $20/2**

No setup fees

www.keylok.com

Also, Access Control Systems & Disk Drive/System Locks

Microcomputer Applications
3167 E. Otero Circle
Littleton, CO 80122
(800-453-9565)
(303) 770-1917 FAX - (303)770 -1863

CIRCLE 587 ON READER SERVICE CARD

Serious Software Licensing and Copy Protection without Hardware Keys or Disk Keys

Our protection actually adds features to your software without the cost and aggrivation of hardware keys.

- ✓ Prevents unauthorized use & duplication
- ✓ Completely secure from all diskcopy systems
- ✓ Great for **Internet** & CD-ROM distribution!
- ✓ Not fooled by back-dating or re-installation
- ✓ Intelligent, reliable, cost-effective, easy to integrate and even easier to support

As CrypKey Instant, protects EXEs or data in 5 minutes, no coding! Foreign Languages! **NEW:** CrypKey for EXCEL spreadsheets!

- ✓ Complete flexibility in licensing, including use by runs, time, enable or add options by phone/fax or e-mail
- ✓ **Ready-To-Try** feature lets your customers run for **one** limited trial period
- ✓ Supports DOS, Win3.x, Win 32s, Win95, Win95B(FAT-32), **Win NT, OS/2** & intelligently **manages network licensing** on all Novell & Microsoft based networks.

"The best combination of features, security, reliability, ease of use and price!"

100% Satisfaction Guaranteed!

Try CrypKey Instant FREE for 30 days: http://www.kenonic.com/crypkey.htm

Kenonic Controls Ltd., Calgary, Canada. Ph: 403-258-6200. Fax: 403-258-6201, e-mail: crypkey@kenonic.com

@www. OR CIRCLE 588 ON READER SERVICE CARD

DATA CONVERSION
Tape • Disk • CDR • 4/8mm
Jaz • Zip • Cartridge • Modem
Multiple Operating Systems
Mainframe ↔ PC Data Experts
In a Rush? No Problem!
PROCESSING
Data Entry
Offshore option for large jobs
Mailing Services—including Barcoding & Presorting
1099/W2/1098/1042S
Printing—Mailing—Filing
Superior SERVICE since 1970
800.533.4443
CHAIKEN SYSTEMS
370 7th Ave. New York NY 10001
CIRCLE 592 ON READER SERVICE CARD

DATA RECOVERY SPECIALISTS
- ESTABLISHED 1980
- GOV'MT CERTIFIED
- NO EVAL CHARGE
- FAST TURNAROUND
- DOS, NOVELL, WIN95, NT, OS/2, MAC, SUN....
ITS
INDEPENDENT TECHNOLOGY SERVICE
800-342-3475
805-526-1555 fax 526-2590
www-i-t-s.com
www. OR CIRCLE 593 ON READER SERVICE CARD

www. OR CIRCLE 589 ON READER SERVICE CARD

DATA CONVERSION
DISKS • TAPES • CARTRIDGES
CONVERSION-DUPLICATION-SCANNING
MORE FORMATS THAN ANYONE !
Quick • Reliable • Quality
WORD PROCESSORS, MINIS
MICROS, SPREADSHEETS
DATABASES, MAIL LISTS
IBM, DEC, APPLE, WANG
HP, WordPerfect, MS-Word
Lotus
Dbase
MICOM
LANIER
CPT, NBI
3480/3490, DC2120
8/4MM, XEROX, CP/M, UNIX ...
NATIONAL DATA CONVERSION
5 East 16th Street, New York, NY 10003
(212) 463-7511
AMERICA'S LEADERS IN DATA CONVERSION
CIRCLE 594 ON READER SERVICE CARD

DATA RECOVERY IN HOURS
- Over 10 years of experience with clients worldwide (HP, NASA, & FedEx).
- We've recovered more than half-a-million megabytes of lost data.
- You only pay if there's a recovery.
- Call 24-hours a day.
LAZARUS
DATA RECOVERY
Working at the speed of business.
800-341-DATA
415-495-5556 • FAX 415-495-5553 • RESTRICTIONS MAY APPLY
391 Clementina Street • San Francisco, California 94103
CIRCLE 595 ON READER SERVICE CARD

MICRO COM
DATA RECOVERY SPECIALISTS.
When you Absolutely, Positively have to get your Data back... call Micro Com now for a free consultation.
800 469-2549
www.mcrecovery.com
818/881-7417 • 818/881-8015 Fax
CIRCLE 590 ON READER SERVICE CARD

ECO Data Recovery
Win95+NT, DOS, MAC
Novell, OS/2
• FLAT RATE
• NO EVALUATION FEE
• 18 YEARS EXPERIENCE
• 24 HR. SERVICE AVAILABLE
• CALL US LAST!
800-339-3412
www. OR CIRCLE 596 ON READER SERVICE CARD

DATA CONVERSION
If you want the most complete conversion services in the industry, just call...
(800) CONVERT
Capabilities include over 6000 formats
Data Recovery Services Available
PIVAR COMPUTING SERVICES, inc.®
165 Arlington Heights Rd. #M
Buffalo Grove, IL 60089
(847) 459-6010
www.pivar.com
CIRCLE 597 ON READER SERVICE CARD

DATA RECOVERY
By Nick Majors' DATA RECOVERY LABS
Why do so many corporations, service technicians, small businesses & computer professionals insist on using Nick Majors and his team of experts for all of their emergency recovery needs? SIMPLE - We are just BETTER at what we do than anyone else in the world!
Nick Majors' DATA RECOVERY LABS
(TORONTO, CANADA / BUFFALO, NEW YORK)
The most technically successful facility available - anywhere - at any price!
Specializing in HIGH-END / TOP PRIORITY JOBS - including Network Servers, Advanced Operating System problems, Multi-drive RAID/ARRAY configurations, Optical Jukeboxes and Tape / DAT recoveries
1.800.563.1167 www.datarec.com
www. OR CIRCLE 591 ON READER SERVICE CARD

CONVERSIONS DUPLICATIONS

TAPE 9-Track • 3480/90/90E • DLT • QIC • 8MM • 4MM
DISK CD-R • 8" • 5¼" • 3½" • 3"

IN A HURRY? Convert DP records/fields
Convert legacy WP data via FTP site or BBS

800-357-6250

PHONE: 317-842-2077 EXT: 300
FAX: 317-842-8294
WEB: http://www.shaffstall.com
E-MAIL: support@shaffstall.com

Services & Systems Sales
Since 1973 SHAFFSTALL CORPORATION
7901 East 88th Street
Indianapolis IN 46256

www. OR CIRCLE 599 ON READER SERVICE CARD

Diskette and CD-ROM duplication. Packaging. Fulfillment. Internet/intranet distribution.

no surprises

When it's got to be right the first time, count on MEGASOFT. From reliable diskette and CD-ROM duplication, packaging and fulfillment to MEGASOFT Web Transporter,™ the fast, powerful way to distribute software and documents over intranets and the Internet. ISO 9002 certified QMS.

FREE CD/disk Project Planning Guides! Call 1-800-MEGASOFT (634-2763) today. Or visit us at www.megasoft.com.

819 Highway 33 East, Freehold, NJ 07728

MEGASOFT

www. OR CIRCLE 601 ON READER SERVICE CARD

A DUPLICATOR OFFER THIS TERRIFIC MAY NEVER BE REPLICATED.

Thinking about investing in duplication equipment? Let us help you determine the best solution. State-of-the-art CD and Disk Duplicators at unbelievable prices.

Call 800 MEGASOFT (634-2763) ext. 395 today! Or visit megasoft.com/equip.html

MEGASOFT

Ask about our CD/disk duplication and media services

www. OR CIRCLE 599 ON READER SERVICE CARD

Design, Print and Apply CD Labels for $79.95

That's NEATO

1 Create your own artwork On Your Computer with NEATO Templates.
2 Print on Any Laser or InkJet using NEATO pressure sensitive labels.
3 Using the NEATO Label Device, apply labels...*PERFECTLY EVERY TIME!*

Kit Includes:
- NEATO CD Label Applicator
- Set of Asserted Labels & Inserts
- CD-FACE™ including Design Software (Mac/PC) and Background Art for Labels & Inserts
- Disc & Jewel Case Templates for Popular Graphics Programs (Mac/PC)

NEATO LLC 250 Dodge Ave • East Haven, CT 06512
800-984-9800 • 203-466-5170 • Fax 203-466-5178
Europe: +44 (0)990 561571 • Fax +44 (0)181 932 0480
See us at: http://www.neato.com

www. OR CIRCLE 602 ON READER SERVICE CARD

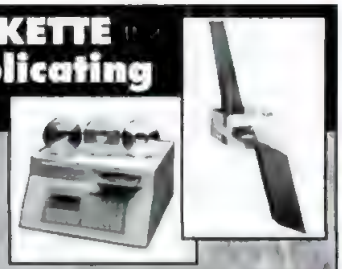
- DISKETTE DUPLICATION
- CD ROM REPLICATION
- PRINTING
- PACKAGING
- WAREHOUSING
- DISTRIBUTION

Floppy Copy INCORPORATED
Integrated Software Services

3822 WEST 1987 SOUTH • SALT LAKE CITY, UTAH 84104
801-975-9411 • FAX 801-975-9394 • 1-800-732-3475

CIRCLE 600 ON READER SERVICE CARD

Affordable DISKETTE & CD-ROM Duplicating Equipment



MAKE YOUR OWN COPIES
- Simple to Use
- Super Reliable.
- A Snap to Set Up.
- Easily Pays for Itself
- Free Media With Your Equipment Purchase.

BULK DISKS/CD-R'S
Verbatim • Dysan • TDK

DISKS: 3.5 LD or HD		
Qty:	250+	1000+
Blank	.31	.27
Formatted	.37	.33

CD-R's: 74 Min	50+	200+	500+
House Brand	4.99	3.99	3.49
TDK	5.29	4.29	3.69

WE CAN ALSO DUPLICATE CD'S AND DISKETTES FOR YOU
24 hour turnaround Custom labels & packaging. Highest quality media. Total Quality Assurance.

800-426-0247
Fax (908) 892-6186
PRINCETON DISKETTE
www.princetondiskette.com
1101 Richmond Ave., Pt. Pleasant Beach, NJ 08742

CIRCLE 603 ON READER SERVICE CARD

MITSUI GOLD

. . . all straight A's?

You can Ace the CD-R game too with a little help from AMC and:

Mitsui Gold recordable CD-Rom media.

✓Absolutely the Best CD-R's in the world and backed by the only lifetime warranty in the business.
✓Affordable 10-disc sample pack available for only $29.99.
✓All you'll need to burn your own CD-Roms and all from one place. Call AMC today at 1-888-558-3108 and be sure to mention ad code PCM10C1 when ordering.

AMC Complete Multimedia Solutions.

ADVANCED MULTIMEDIA CONCEPTS
P.O. Box 3456 Redmond, WA 98073-3456
888-558-3108 www.pcm.amc-direct.com

www. OR CIRCLE 604 ON READER SERVICE CARD

Everything CD-R

Personal Service. Low Prices

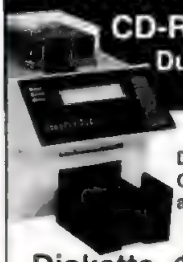
- Blank Media / Kodak, MTC TDK 74min - $5.75
- Small volume duplication 74min - $15.50
- Custom silkscreen printing (done in-house) 3 colors Fast, Professional, Affordable
- CD-ROM replication

Your one-stop CD-R Shop

800-255-3142
Diversified Systems Group
206-392-0900 / Fax 206-392-5083
http://dsgi.com info@dsgi.com

CIRCLE 609 ON READER SERVICE CARD

AUTOMATIC CD-R & DISK Duplicators



Diskettes and CDR media at best prices

Diskette duplicators from $1,295

CD-R duplicators from $5,995

(510) 689-1695
fax (510) 689-1263
Lease, Rent, Trade-in
Email:copypro@dnai.com
www.copypro.com
CopyPro 1-800-887-9906

CIRCLE 612 ON READER SERVICE CARD

JetMaster — Save Money in Printing Costs

Re-Usable Ink Jet Refill System

Lowest cost per recharge in the world. Buy kit, later just buy additional ink, which is available in 2 oz., pint, and gallon size. Costs as low as $1 per recharge. Waterproof inks available. Most inkjet printers supported.

BJ3 (Stylewriter Canon BubbleJet)	$29.95
PM6 (HP 500 Series)	$29.95
PM6-MC1 (HP 500 Series Black/Color)	$69.95
PM6-MC1-600 (HP 600 Series Black/Color)	$69.95
BJ6-MC1-600 (Canon BJC-600)	$49.95
BJ6-MC1-2440 (Canon BJC-4000, 4100)	$49.95
Black Jet Ink (2 oz.)	$10.50
Color Jet Ink (2 oz.)	$11.50

Order toll free 1-800 547-3303

Computer Friends, Inc.
http://www.teleport.com/~cfriends/
E-Mail:cfriends@teleport.com
Tel. (503) 626-2291 Fax (503) 643-5379

CIRCLE 605 ON READER SERVICE CARD

CD & DISKETTE DUPLICATION

- Quality Disk & CD Duping, low prices, fast turnaround
- Labels for CD & Diskette, Color printing on CD's
- CD&Diskette fulfillment. Let us send out your demo for you
- Great prices on quality, high-clip media, call for current pricing

DUPTEK INC.
Quality...Everytime
PO Box 0, Wellington, MO 64097
888-899-3475
816-934-8518 FAX 816-934-2590

CIRCLE 607 ON READER SERVICE CARD

CD-ROM DUPLICATION

Same Day CD-R Duplication
Labeling and Insert Printing
Extensive Premastering any format from any source
Quick Turn CD-ROM Replication
Turnkey Production of CD/CD-R
Art/Film/Printing Services

DISC PRESS
FREE Guide to CD-ROM Premastering visit our website
www.discpress.com
or call 888-311-DISC (3472)
203 759 0574 • Fax 203 759 0553

CIRCLE 610 ON READER SERVICE CARD

RAPID REPRODUCTION

SIMPLE-FAST-SMART- RELIABLE MANUAL DISKETTE DUPLICATORS
AX $1,695 AS SHOWN

AX 1000-2000 SERIES
- FORMATS, COPIES, VERIFIES
- 360-5.25"/HR. – 180-3.5"/HR
- COPIES ALL MFM FORMATS
- RELIABLE TEAC DRIVES
- AVG. 100,000 COPIES/DRIVE
- STAND ALONE OPERATION
- 1 YEAR WARRANTY
- AUTOLOADERS AT $2,195

AXIOMATIC TECHNOLOGIES CORPORATION
4995 Timberlea Blvd. Mississauga
Ontario, Canada, L4W 2S2
(905)602 9270 Fax: (905) 602 9279

CIRCLE 613 ON READER SERVICE CARD

AUTOMATIC DUPLICATION EQUIPMENT

For
- CD-R
- Diskettes
- HDD
- PCMCIA

Rated Best Value

Floppy & CD-R Printers, too!

Floppy Standalones from $1695
CD-R Standalones from $5495

OVER 13,000 UNITS INSTALLED WORLDWIDE!

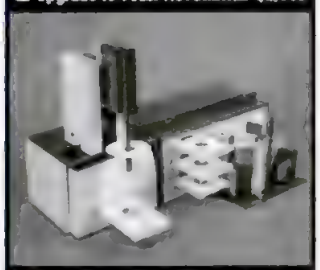
888-723-3475
510-373-6060
championsms.com

CHAMPION

CIRCLE 606 ON READER SERVICE CARD

Unbelievable !!!

▲ CD-R Duplicator LOADED $1,995
▲ + "Signature" CD Color Printer $1,295
▲ Upgrade to FULLY AUTOMATED $2,995



Modular, Expandable, Standalones

1-888-276-7992
Fax 510-417-2903
http://www.costas-systems.com
email: costasys@ix.netcom.com

www. OR CIRCLE 608 ON READER SERVICE CARD

SLIP.NET PUT YOUR BUSINESS ON THE WEB!

WEB HOSTING $19.95 Per Month

- Unlimited E-mail Forwarding
- Domain Name Registration available (www.your company.com)
- 1000 MB of Data Transfer per Month
- 50 MB Storage for Html Documents and Graphics
- Full Redundant T3 Connection to the Internet
- Tons of Web Tools and Wizards
- Real Time Reporting on Web Site Activity
- Support for Custom CGI Scripts
- Reseller's Welcome

SLIP.NET
1-800-SLIP.NET
www.slip.net
Order OnLine!

www. OR CIRCLE 611 ON READER SERVICE CARD

2 Live Amateur Lesbians

Live 2 on 1 Adult Videoteleconferencing on your PC...

Type or talk privately to 2 amateur lesbians at once while you watch them tease and please each other on your command.

For a free disk, call 1-800-958-6770

www.2livelesbians.com
BBS 203-596-2496

Must be 18+ VISA

CIRCLE 614 ON READER SERVICE CARD

www.adultfantasies.com
WHERE YOUR FANTASIES BECOME YOUR REALITY
CIRCLE 615 ON READER SERVICE CARD

Hardcore Underground Sex Sites
• Strange/Rare Pics
• Updated Daily!
• 40+ Categories
Including...
•Amateurs•Bizarre•Bondage•
•Busty•Cheerleaders•Hardcore•
•Public Nudity•TS/TV•Young Girls•
Plus Many More!
www.sexsites.com
LIVE SEX SHOW!
Live Girls-24 Hours
1-800-617-6699
Adults Only!
CIRCLE 620 ON READER SERVICE CARD

Lipstix
Live Video Sex
Hot Young Florida Babes Are Waiting To Please You
Free 10 Minutes Live One-On-One
Free 30 Minute Peepshow
FREE PICS
www.lipstixxx.com
Or For Free Disk
1-800-260-5124
Lesbian Shows Also Available
CIRCLE 622 ON READER SERVICE CARD

4sexfreaks.com
Live Girls
No downloads
Picture gallery
1000's updates
Adult Video Clips
Adult Mall
Kinky Personals
Erotic Confessions
Erotic Chat Room
Unlimited Monthly Access
must be adult 18 & over
CIRCLE 623 ON READER SERVICE CARD

LIVE Interactive VIDEO CONFERENCING
Love is Hot
Adult 18+
24 hrs. • FREE plug & software
FREE Chat direct with our HOT babes!
www.loveishot.com
CIRCLE 618 ON READER SERVICE CARD

LIVE SHOWS
lesbian & gay
sweethole.com
lesbian & gay
MUST BE 21 OR OVER
LIVE SHOWS
CIRCLE 618 ON READER SERVICE CARD

Club Taj Mahal
"GIRLS"
Here's your chance to enjoy the beautiful
Privately One on One
100% Live Totally Adult Entertainment
Video Conferencing
Featured In: Rolling Stone, New York Times, CNN, NBC Real Life, Xtra
http://www.clubtajmahal.com
CIRCLE 616 ON READER SERVICE CARD

BABYLON X
RARE COLLECTORS PIX!
100% GENUINE
HARDCORE BEDROOM POLAROIDS
SNEAKY PAPARAZZI HOT-SHOTS!
• MADONNA HARDCORE SHOT!
• PRINCESS DIANA RARES 4U!
• PAMELA ANDERSON'S WEDDING VIDEO!
• ANNE HECHE'S PORN DEBUT!
• CINDY CRAWFORD!
• BARBRA STREISAND!
Don't miss out - get in NOW! While they're still there!
School Girl Strip
LIVE IN YOUR BROWSER!
24 Hours a Day, 7 Days a Week
www.babylon-x.com
ADULTS ONLY - MUST BE 21 YEARS OR OLDER
CIRCLE 617 ON READER SERVICE CARD

HOT PEEP SHOW
24HRS/DAY - LIVE!
DIRECTLY FROM AMSTERDAM
• Peep at 100 different gorgeous girls and couples enjoying themselves.
• Interact with them.
The most striking shows you've ever seen
WWW.HOTPEEP.COM
• FROM AMSTERDAM, UNUSUAL, UNCENSURED HOT PICTURES
• ONLINE VIDEOS THAT YOU HAVEN'T SEEN ANYWHERE BEFORE
• MEET YOUR MATE IN THE FREE SWINGING AREA
WWW.BIZAR.COM
adults only 18+
CIRCLE 619 ON READER SERVICE CARD

ROCKY MOUNTAIN PLAYMATES
Live one on one Adult Videoteleconferencing on your PC
The hottest nude female Playmates at your command! Download our software and make your fantasies a reality tonight!
800-396-1133 A7222
Brought to you by RockMan
CIRCLE 621 ON READER SERVICE CARD

FREE! FREE! FREE! FREE!
THE WORLD'S LARGEST EROTIC SITE
http://www.4sex.com
FREE LIVE B&W VIDEO CONFERENCING
FREE LIVE B&W VIDEO CONFERENCING
FREE LIVE B&W VIDEO CONFERENCING
FREE LIVE B&W VIDEO CONFERENCING
FREE LIVE B&W VIDEO CONFERENCING
FREE LIVE B&W VIDEO CONFERENCING
FREE B&W LIVE VIDEO CONFERENCING
WITH $2.95 TRIAL MEMBERSHIP
ALL SITES:
• STRAIGHT • GAY • • SHEMALES • S&M • • AMATEURS •
• NO DOWNLOADING • NETSCAPE BROWSER COMPATIBLE
18 & Over
http://www.4sex.com
FREE! FREE! FREE! FREE!
CIRCLE 624 ON READER SERVICE CARD

PC MAGAZINE MARKETPLACE BUSINESSCARD

PC Magazine's BusinessCard section is a forum for innovative, hard-to-find and low-cost PC products and services. Ads are listed by product category and include Reader Service numbers to allow fast, easy response.

RATES:

1 issue–$1070, 3 issues–$935, 6 issues–$905, 12 issues–$860,17issues–$810,22 issues-$800 Multiple-ad per issue rates also available. Prepayment must accompany each insertion. VISA/MC welcomed.

AD FORMAT:

PC Magazine will typeset each BusinessCard ad. Advertisers should furnish typewritten copy. Ads include: 1) Headline (1 line, initial caps=30 characters max, all caps=25 characters max), 2) Descriptive copy (5 lines, 225 characters max), 3) Company name (same specifications as headline), and 4) Address and telephone number (2 lines, 40 characters per line). No logos, art-work or camera-ready ads. Publisher reserves the right to edit supplied copy to meet section specifications.

DEADLINES:

PC Magazine is published 22 times a year, (bimonthly except for July and August). The BusinessCard closing is approximately two months prior to issue date.

Please send copy and payment to:
PC Magazine BusinessCard
One Park Avenue, 3rd Floor
New York, NY 10016
For more information, call 800-825-4237 *or* 212-503-5115, FAX: 212-503-5860.

HARDWARE/BATTERIES

Batteries/Tools for Mobile Professionals
Do your "2-HR" batteries only last 15 min? Try our long-life batteries, ac adaptors, car cords & chargers for Laptop, Cellular, Camcorder. Largest selection in the country! 1 Yr. Wrnty. Low prices. Call 800-228-8374 for FREE battery guide/catalog.
1-800-Batteries
2301 Robb Drive, Reno, NV 89523
24hrs/7dys•F702-746-6155•www.800Batteries.com

CIRCLE 721 ON READER SERVICE CARD

FOREIGN LANG./FONT/TRANSLATION

Foreign Language Software Leader
Largest selection of "Translation, Dictionary, Language Learning, Fonts, Word-Processing, OCR, Etc." from any company! Best prices, Satisfaction Guaranteed! Free 52 pg. Catalog. www.worldlanguage.com
World Language Resources
800-900-8803 Tel310-996-2300 Fx310-996-2303
2130 Sawtelle Blvd. Ste 304A L.A. Ca 90025

CIRCLE 726 ON READER SERVICE CARD

STATISTICAL/RESEARCH

The Survey System for Windows
Analyzes:marketing, public opinion, customer satisfaction, employee attitude surveys. Handles mail, personal, phone, scanner, disk-by-mail, computer interviews. Records verbatim text/voice answers. Powerful, flexible, user friendly. Free support.
Creative Research Systems
140 Vista View #100, Petaluma, CA 94952-4728
Ph.(707)765-1001/Fax (707)765-1068
www.surveysystem.com

CIRCLE 730 ON READER SERVICE CARD

COMPUTER SYSTEMS

Custom Built Systems
•Custom built Pentium Desktop & Laptop Systems
•Wholesale pricing software
Creative Computer Consulting
5231 Santa Fe Drive, Suite 295
Littleton, CO 80120
(303) 795-9663 Fax (303) 730-1007
(800) 875-8452

CIRCLE 722 ON READER SERVICE CARD

RELIGION

Bible on Disk or CD-ROM
Full Featured..Fast and Friendly Bible Study Software. As the leader in Bible study software since 1981 we have continued to listen to our customers and provide them with the tools they need. FREE catalog www.brs-inc.com/bible
Bible Research Systems
2013 Wells Branch Pkwy. #304 Austin, TX 78728
1-800-423-1228 1-512-251-7541

SERVICE/COMPUTER INSURANCE

Insures Your Computer
The COMPUTEROWNERS℠ insurance policy repairs or replaces hardware, media and purchased software. Rates as low as $49 a year covers theft, fire, accidents, power surge and more! Call for immediate coverage or info. **1-800-800-1492.**
Safeware, The Insurance Agency Inc.
5760 N. High Street P.O. Box 656
Columbus, OH. 43085

CIRCLE 731 ON READER SERVICE CARD

PERIPHERALS

240volts/50Hz PRODUCTS
•EPSON•HEWLETT PACK.•CANON•OKIDATA•APC
•Dealers Inquiries Welcome•Lotus, Microsoft & more available In Spanish, French, Portuguese
•Awarded **EXPORTER OF THE YEAR IN 1994**
•**FREE** Catlg- 30,000 items - sales@intlhitech.com
International High Tech Marketing
12285 SW 129th Court, Miami, Florida 33186
Tel: 305-254-8731 Fx:305-254-8736 Call Today!

CIRCLE 723 ON READER SERVICE CARD

SERVICES/DATA RECOVERY

DATA RECOVERY & CONVERSION
Don't PANIC!! call VOGON
Tape, Optical or CD Media
- Accidental Overwrites
- Hardware or Software Failure

VOGON
US Ph 405-321-2585 Fax 405-364-8242
UK+44-118-989-0042 Fax 0040

CIRCLE 727 ON READER SERVICE CARD

MARKETING POWER
Is yours when you place your message in this space. Reach 1,044,227 buyers of all kinds of PC products. Give your business card PC Magazine Marketplace Power.
BusinessCard
Call 1-800-825-4237 today.

SOFTWARE/DATA ENTRY

The Data Entry Emulator™
Full featured, heads-down data entry with two-pass verification, edit language, output record reformat, operator statistics, batch control, on-line help, free tech support, key from images (NEW!).
For PC, PC LAN, S/36, or AS/400.
Computer Keyes
21929 Makah Road, Woodway, WA 98020
800-356-0203/206-776-6443/Fax: 206-776-7210

Hand Your Business Card...
To 1,044,227 of the most qualified buyers in the PC market. These brand-specifiers are looking to buy while reading the industry's #1 publication. There is no more cost-effective or efficient way for you to build sales.
BusinessCard
Call your BusinessCard representative today.
1-800-825-4237

We Make It So Easy—
Leave your business card with us and we'll do the rest. PC Magazine will create your BusinessCard for you. It's so easy—and so very effective.
BusinessCard
Call your BusinessCard representative today.
1-800-825-4237

Advertising Sales Staff

One Park Avenue
New York, NY 10016
212 503-5100

DISPLAY ADVERTISING

Nancy Newman - Publisher
(212) 503-4453
Peter Longo - National Associate Publisher
(212) 503-3849
Vickie Pinsky - National Sales Director
(212) 503-5651
Ad Systems Manager
Julie Eigo
(212) 503-5107
Advertising Coordinator
Jennifer Kim
(212) 503-5037

Kimberly Jackson - East Coast Ad Director
(617) 393-3055

MA, NH, VT, ME, RI, Canada

District Sales Manager
Cameron Brown (617) 393-3058
10 President's Landing, Mystic Center
Medford, MA 02155
Account Representative
Amy Farrell
(617) 393-3059

CT, NY, NJ, NC

District Sales Manager
Thomas Koletas (212) 503-3703
One Park Avenue, 4TH Floor
New York, NY 10016
Account Representative
Beatrice Olivas (212) 503-5112

DE, MD, DC, VA, WV, SC, AL, MS, TN, AR, KY, GA, FL, PA

District Sales Manager
Kevin Hein (212) 503-5176
One Park Avenue, 4TH Floor
New York, NY 10016

Cameron Brown - Area Manager
(617) 393-3058

WI, IL, IN, MN, MI, IA, ND, SD, OH

District Sales Manager
Ed Beach (312) 214-7353
150 North Wacker Drive, 25TH Floor
Chicago, IL 60606
Senior Account Representative
Katie Gillon
(212) 503-5011

TX, OK, LA, NM, CO, AZ, KS, NE, MO

District Sales Manager
RJ Kirkland (214) 360-5725
5956 Sherry Lane, Suite 625
Dallas, TX 75225

Mike Kisseberth - West Coast Associate Publisher
(415) 547-8809

CA (Los Angeles), HI, NV

District Sales Manager
Stephanie Sload (310) 268-1381
11766 Wilshire Blvd., Suite 1550
Los Angeles, CA 90025

CA (San Diego & Orange County)

District Sales Manager
Jeff Kamikow (714) 852-5920
18301 Von Karmen Avenue, Suite 330
Irvine, CA 92715

CA (San Jose), CO, ID, AK

District Sales Manager
Jennifer Hillis (415) 547-8816
50 Beale Street, 13TH Floor
San Francisco, CA 94105
Account Representative
Jennifer Duddy
(212) 503-5024

Tim Castelli - West Coast Ad Director

CA (San Francisco & North) WA, BC, OR

District Sales Manager
Jordan Klineman (415) 547-8807
50 Beale Street, 13TH Floor
San Francisco, CA 94105
Account Representative
Jason Ratner
(212) 503-5047

CA (South San Francisco to Mountainview), UT, WY, MT

District Sales Manager
Jon Schwartz (415) 547-8813
50 Beale Street, 13TH Floor
San Francisco, CA 94105
Account Representative
Brian Gleason
(212) 503-5161

For more information regarding *display* advertising please call:
212 503-5100
1-800-33MAG AD

CENTRAL ADVERTISING

VP, Central Advertising
Robert A. Bader

Director of Sales and Marketing
Ken Holmstrom

Sales Manager
Bill Herbst

Production Director
Vicki Egan

Sr. Production Coordinator
Rob Scott

Sr. Advertising Coordinator
Marilyn Aldir

ID, MT, NV, OR, UT, WA, WY, AK, Canada

Account Representative
Rachel Levy
(212) 503-3626

AL, AR, FL, GA, LA, MS, NC, SC, TN, WV, KY, DE, DC, IL, IN, MD, MI, VA, WI

Account Representative
Jackie O'Hare
(212) 503-5138

CA (213, 310, 619, 714, 805, 818, 909), HI

Account Representative
Janet Fu
(212) 503-5132

CT, ME, NH, RI, VT, MA, NJ, PA, NY, OH, Foreign

Account Manager
Patricia Nunez
(212) 503-3602

CA (209, 408, 415, 510, 707, 916)

Account Representative
Lisa Weseley
(212) 503-5118

CO, IA, MO, NE, AZ, KS, MN, ND, OK, SD, NM, TX

Account Representative
Andrea Sachs
(212) 503-4579

Business Card Advertising
Call: 1-800-825-4237
PC Magazine Marketplace
One Park Avenue, 3RD Floor
New York, NY 10016

For more information regarding *central* advertising please call:
212 503-5115
1-800-825-4237

KDS

What are you looking at?℠

When you buy a Visual Sensations™ monitor,
it's backed by the best support in the business with the

KDS Advanced Replacement Express Service.

KARES eliminates factory returns and dealer swaps by letting customers call KDS directly if a Visual Sensations ever needs service. KDS then rushes them a replacement by FedEx delivery, keeping their downtime to a minimum.

Resellers like it because it eliminates them from the post sales cycle. And customers love it because it gives them

peace of mind for the lifetime of their purchase.

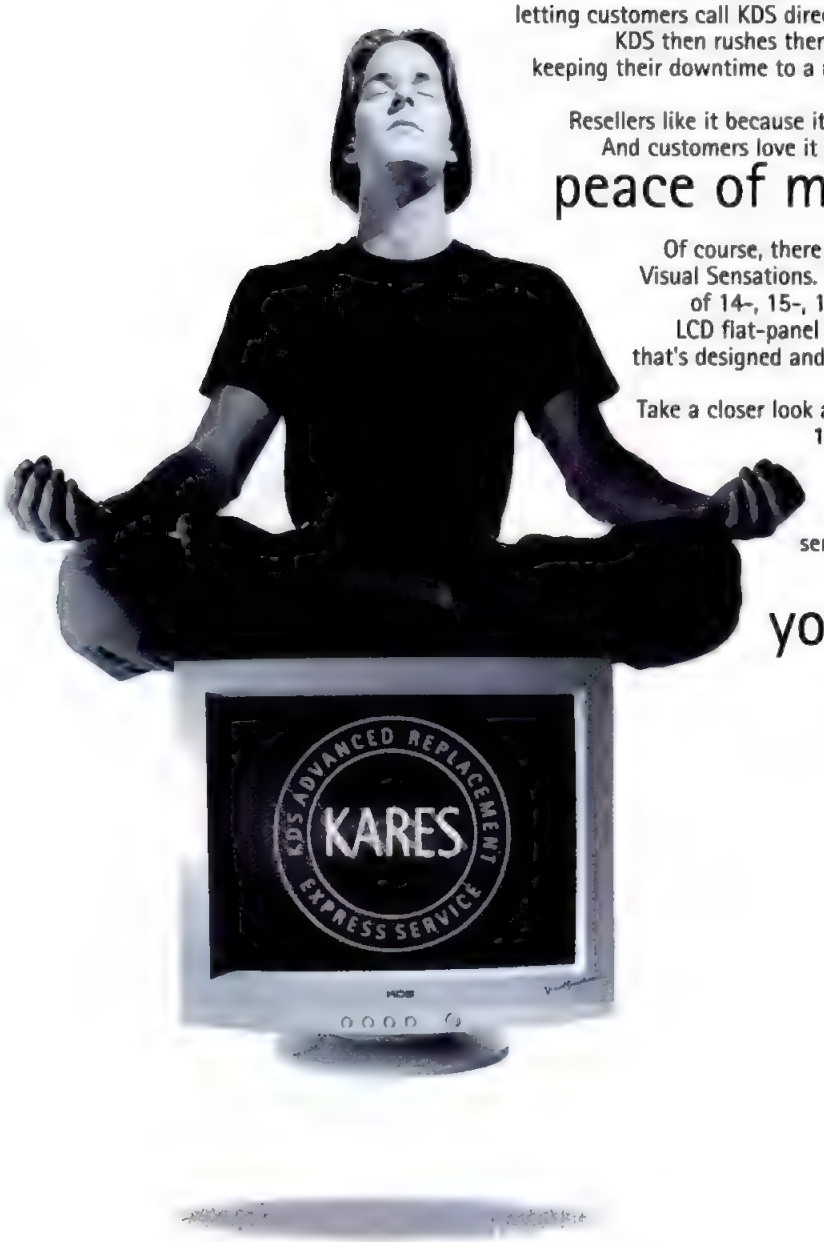
Of course, there are plenty of other reasons for choosing Visual Sensations. Including the fact that with a complete line of 14-, 15-, 17-, 19- and 21-inch monitors — plus LCD flat-panel display and touch-screen models — there's one that's designed and priced right for every application.

Take a closer look at Visual Sensations by calling **1-800-237-9988** or checking out the KDS Web Site at **www.kdsusa.com**.

Because if you're looking for great service with a great monitor,

no one supports you like KDS does with KARES.

Order Desk: 800-677-8443



© 1997 KOREA DATA SYSTEMS CO., LTD. All rights reserved. Visual Sensations is a trademark of KOREA DATA SYSTEMS CO., LTD.

CIRCLE 170 ON READER SERVICE CARD

After Hours

Fall Classics

You can keep the season alive with one of these five baseball games.

Aaron vs. Ruth

The mantra behind this solid title could be *"If you load it, they will come."* Aaron vs. Ruth brings to virtual life many baseball greats—Hank Aaron, Ernie Banks, Babe Ruth, Ty Cobb, and other famed players. And you don't have to mow down some guy's cornfield to play with them.

The graphics, which stress the look and feel of classic baseball, are very good. The fields appear authentic, and the old buildings in the background add to the nostalgia. The players are well animated and wear traditional uniforms. The announcer's voice over the stadium public address system is another nice touch.

The game play is good and adds to the feeling that you've been thrown back 50 years. You can choose the field, weather conditions, and teams, as well as the ability to play an individual game, series, or season. Compared with more "modern" games, however, Aaron vs. Ruth may disappoint some players with its slim array of management options.

Also, there aren't many players to choose from; Nolan Ryan and Mickey Mantle are missing, for example. And this game doesn't have as many features or options as the others reviewed here.

In the end, Aaron vs. Ruth is more about the legends of baseball than about simulating the modern game. If you're a fan of vintage baseball who's always wondered whether Ruth could smack a homer off Maddux, this is the game for you.—*Shane Mooney*

Front Page Sports: Baseball Pro '98

When it comes to extensive coaching and management strategy, this game is a big-league powerhouse. The graphics and action are uninspiring, however, making Front Page Sports: Baseball Pro '98 a title for armchair managers only.

You get to direct nearly every aspect of a baseball league, whether managing one team or being absolute boss of the entire league. You have access to news, history, statistics, schedules, and trades as well as initial, free agent, and amateur drafts.

The season starts with spring training, where you can have players work out to increase their skills. A midseason All-Star break and a league championship add to the authenticity. The game even supports career play, so players in the game get older and eventually retire.

Games can be either simulated for fast results or controlled manually. Unfortunately, manual control is slow and often quite dull.

After spending time with Triple Play 98, we found the graphics to be quite disappointing. In addition, the game offers no spoken play-by-play or commentary. Instead, the play-by-play dialogue appears as running text onscreen. This spoils the illusion of participating in—or even watching—a real game.

Still, if statistics and management options are more important to you than swinging a computerized bat, Front Page Sports: Baseball Pro '98 is in a league by itself.—*SM*

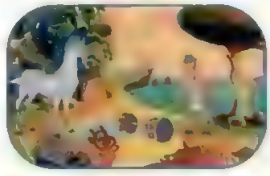
Grand Slam

Virgin Interactive Entertainment's Grand Slam is a new entry onto the virtual diamond. Like most expansion teams, it has big problems.

Let's start with the basics. When we tried to install Grand Slam, the autorun feature

INSIDE

Here Comes Hercules
Disney's latest cartoon hero stars in this fun-filled title. *Page 388.*



Beyond Dr. Funfrock
Twinsen returns in this impressive sequel to Relentless: Little Big Adventure. *Page 391.*

Heavy-Handed
ThrustMaster's latest joystick is one serious controller for flight sim enthusiasts. *Page 391.*

would not work. Also, the game simply refused to run at all on two different test systems.

Once we got the game to work, we were impressed by its unique pitching and batting power meters. These work like the swing meters in most golf games and are truly innovative. We also liked the fact that the catcher suggests a type and placement for every pitch. Unfortunately, these features alone cannot save Grand Slam from being swept aside by the other games in this roundup.

The graphics are poor—all the pitchers look fat, and the catcher is barely half the size of most of the batters. The default view of the field is practically unusable, as the players—particularly the outfielders—are too small to offer any accurate sense of depth. The game's optional zoom-in camera view corrects this problem but is available only if you have a 3-D accelerator card. Also, the spoken play-by-play commentary is annoying and repetitive in the extreme—certainly not up to Triple Play 98's standards.

Maybe next time around, Grand Slam will fix these problems and take advantage of the pitching and batting power meters. But this year, the game is clearly a cellar-dweller.—*Michael E. Ryan*

Tony La Russa Baseball 4

For a great many years, Tony La Russa Baseball was the game of choice for statistics and management options. But this year's version tries to be all things to all players, and the result is flawed.

The game is still pretty good (at least in terms of the number of available options) if you're really into managing. Tony La Russa himself pops up from time to time to offer advice: For example, he may suggest what to do when you have two outs and runners on first and third.

Beyond management, however, the game quickly unravels. The graphics are almost painful to watch, especially in view of the fact that every player's uniform bears the number 11. And the game controls are even more painful than the graphics. It's nearly impossible to maneuver your fielders successfully—you'd have an easier time organizing a fan appreciation day for Albert Belle.

Finally, the game completely misses the ball when it comes to accurate statistics. Sure, no computer game is going to generate 100 percent realism—but more than once, Tony La Russa Baseball 4 gave us a dozen teams finishing the year with over 100 wins. This game falls short in the one area where it's supposed to have an advantage over the competition.

If it's management ability you want, you'd be better off going with Front Page Sports: Baseball Pro '98. At least the players in that game have different numbers on their uniforms.—*SM*

Triple Play 98

PC MAGAZINE EDITORS' CHOICE

Last year's version of Triple Play was excellent and impressed us with its top-notch graphics and game play. This year's version is even better. The game has a few bugs but remains the best baseball game in this roundup.

The graphics are incredible. Each of the 3-D, motion-captured polygonal players has an accurate name and number on his jersey. And the jerseys look like the real thing, because Triple Play 98 is the only game to have licenses from both Major League Baseball and the Major League Baseball Players' Association.

The game controls are intuitive and simple while offering plenty of options. One odd absence: Triple Play 98 has no bullpen feature. The spoken play-by-play and commentary can be quirky but is still good and at times even hilarious.

Triple Play 98 is geared toward arcade-action fans but provides a solid array of statistics and management options. Some of the league statistics are inflated, but they are still more accurate than those in Tony La Russa Baseball 4.

The game does exhibit the occasional glitch, such as runners attempting steals without your say-so and hitters facing away from the plate. Even with these oddities, however, Triple Play 98 is a great game and the class act of the virtual baseball league.—*SM*

"My business can't stop when the power does...

Back-UPS® Office™'s instant battery back-up can keep you up and running even when the power goes down.

$30 REBATE

With the Purchase of a Back-UPS Office between [illegible]

You can download redemption card from our Web Site at www.apcc.com/english/promo025.htm or visit local retailers below for more info

... I rely on Back-UPS® Office™ from APC."

"I've got Back-UPS® Office™ from American Power Conversion. Back-UPS Office combines world class surge protection, a $25,000 equipment protection guarantee* and instant, uninterruptible battery back-up power.

So when the power goes out, and it will.... I have plenty of time to save what I am working on and shut down safely.

Plus, I am protected from surge damage, keyboard lock-ups, data loss and power problems transmitted to my workstation over data and power lines."

Look for APC power protection products - starting at $24.95

So, if you just bought your first computer, or run a company that needs hundreds, you can depend on the reliability and peace of mind that comes with APC products. Why? It's simple. APC protects more computers for more companies in more countries than anyone in the world.

Now, that's a reason to smile.

CIRCLE 341 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

FREE Consumer Catalog

☐ **YES!** I'd like to receive my FREE catalog.

☐ **NO,** I'm not interested at this time but please add me to your quarterly newsletter mailing list.

Name: _____

Title: _____

Company: _____

Address: _____

City/Town: _____

State: _____ Zip: _____ Country _____

Phone: _____ Fax: _____

Brand of UPS used? _____ # _____

Brand of PCs used? _____ # _____

Brand of Servers used? _____ # _____

APC

888-289-APCC x8245

Fax: (401) 788-2787

www.apcc.com

E4-BO

APC's Back-UPS Office is available at:

Insight 800-859-5614 · SOFTWARE ETC · Fry's · IT Zone 800-258-2088 · OfficeMax · MICRO CENTER · STAPLES · GLOBAL COMPUTER SUPPLIES 800-845-6225

©1997 APC. All Trademarks are the property of their owners. * See policy for details. BP20EF

• 800.347.FAXX PowerFax • E-mail: apcinfo@apcc.com • 132 Fairgrounds Road, West Kingston, RI 02892 USA

APC has won more awards for [illegible] than all other UPS vendors combined.

Heroic Fun with Hercules

The mythological movie from Disney comes to life in this impressive CD-ROM.

Disney's Animated Storybook, Hercules

Based on this summer's blockbuster film, Disney's Animated Storybook, Hercules has all the makings of a hit CD-ROM. It tells the story of Hercules, the mythical son of Zeus, and his quest to become immortal. Hercules battles Hades, voiced by James Woods, to save the world and the life of his true love. The title's supporting characters, easily recognizable as Paul Shaffer, Rip Torn, and Danny DeVito, provide the comic relief, while two soul singers act as narrators.

As with other Animated Storybooks, getting through the story is only part of the fun. The real excitement starts when kids begin playing the five different activities that go along with the story. Kids can play Hades' Checkers against the computer or a friend. Hydra Knock Out asks them to match heads by color and pattern.

Monster Maker lets your children create their own monsters. When they're done, the monsters come alive, talking and interacting with Hercules. Mount Olympus Maze helps kids develop problem-solving skills as they maneuver their way up a mountain and defeat the Titans.

The last activity, Zeus' Constellations, is the only dud in the group. When children click on a star, the constellation to which it belongs appears. Then, either the constellation's character or Zeus recites a short poem. A nice idea, but perhaps too sophisticated for the intended audience—children four to eight.

Finally, a new karaoke feature that will have kids out of their seats dancing and singing in no time rounds out the title. Kids can sing along with three of the movie's most popular songs, including the catchy theme "Zero to Hero". They'll probably know all of the words long before the video hits the rental stores.—*Karen J. Bannan*

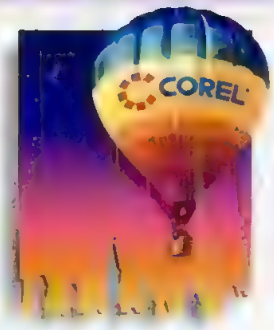
How wmushc time od you waste bacspacking?

Whether you're learning to type or just want to improve, one teaching system rises above the rest. Mavis Beacon Teaches Typing. In new Version 8, Mavis gives you tips on healthy typing habits and office ergonomics. And only Mavis adjusts to your skill level and continually monitors your progress, like a good teacher should. Just ask any of her five million alumni. For more information and the name of your local retailer, call 800-234-3088.

Type better. Work faster.

MINDSCAPE®
CIRCLE 012 ON READER SERVICE CARD
OR GO TO WWW.PCMAG.COM/ProductLink
©1997 Mindscape, Inc. All rights reserved.

THE WORLD'S MOST POPULAR GRAPHICS SOFTWARE



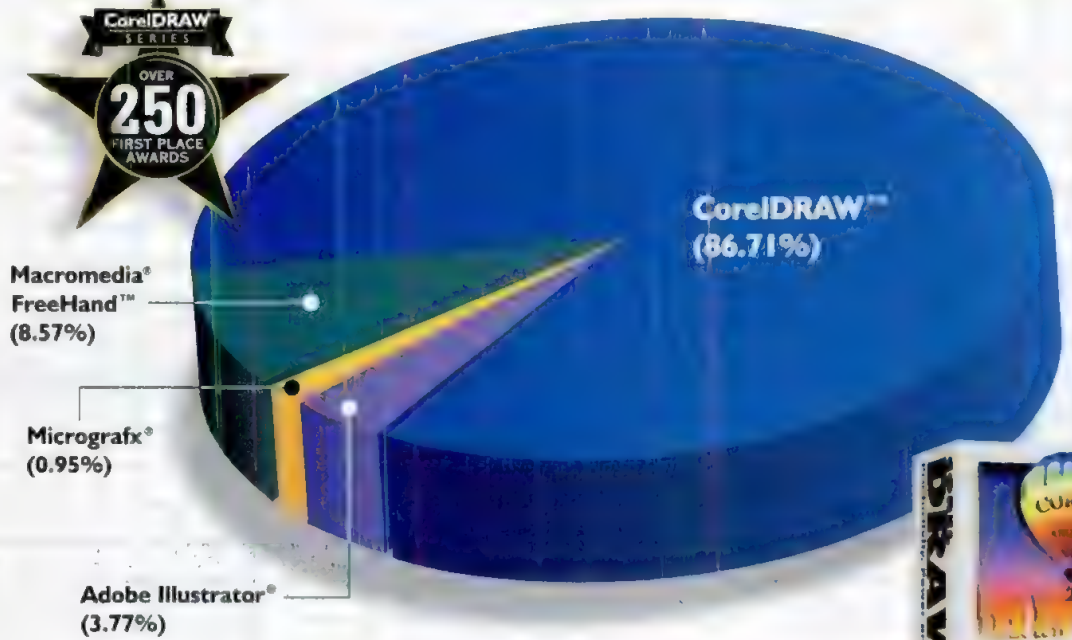
COREL DRAW™ 7

The numbers speak for themselves.

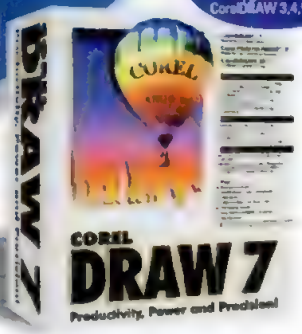
With more than 85% market share†, CorelDRAW™ continues to be the graphics standard for professionals in the Windows® market. CorelDRAW 7, the latest version of the award-winning suite, combines powerful, easy-to-use tools for illustration, page layout, photo editing, and 3D modeling and rendering. And each application has the precision and speed you demand from your software. Go with the first choice of illustration professionals. Let CorelDRAW 7 intensify your creative genius.

86.71%†
Windows® market share

CorelDRAW™ SERIES
OVER 250 FIRST PLACE AWARDS



$249.99* SRP
Upgrade from CorelDRAW 3,4,5 or 6



†Market Share – Drawing & Painting Software, *PC Data* 1996 unit sales
Percentage representation based on unit sales of top four competitors in the vector-illustration and image-editing software category only

CIRCLE 332 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

BEST BUY
COMPUSA
1-800-COMPUSA
STAPLES

*Suggested retail price plus applicable taxes in US$. Dealer may sell for less. Prices may vary from location to location.

COREL WTA TOUR

COREL
www.corel.com
Call now for faxed literature!
1-613-728-0826 ext. 3080
Document # 1085

Copyright © 1997 Corel Corporation. All rights reserved. Corel and CorelDRAW are trademarks or registered trademarks of Corel Corporation and Corel Corporation Limited. Micrografx is a registered trademark of Micrografx, Inc. Macromedia is a registered trademark and FreeHand is a trademark of Macromedia, Inc. Adobe Illustrator is a registered trademark of Adobe Systems Incorporated. All other product, font and company names and logos are trademarks or registered trademarks of their respective companies.

SECRETLY----------

catch your MOTHER-IN-LAW ON VIDEO vacuuming with a hula hoop while singing satanic POLKA songs. Convert it to an e-mail & send it to her church social director's computer.

Plug one end of the QuickVideo Transport into your PC's external parallel port and the other into any video source (like a camcorder or VCR, for instance) and WHAM! You're ready to capture full motion video (snapshots, too) and instantly put 'em in your PC. • Once you have them, you get to use all the software we've included to create cool video clips. You can edit, add great special effects, put in music and voice-overs, morph, and a whole lot more. • Then, if you want, use our exclusive Videogram Creator software to send your video or snapshots with voice-overs to any PC in the world via e-mail or the Internet. • Now get this: the people you send it to don't need anything special to play it back. • The QuickVideo Transport makes it all easy, fast, and simple. • Think about this: do you want to create and send full motion videos or be limited to a still-picture-snapshot thing? • Buy the QuickVideo Transport at the place where you buy all your computer gear.

CHECK IT OUT	QVT	SNAPPY
Full Motion Video	☑	☐
Still Image "Snapshots"	☑	☑
Snapshots w/voice	☑	☐
Videogram Creator	☑	☐
Image Effects & Morph	☑	☑
Video Conferencing	☑	☐
Parallel Port Connect	☑	☑

Check out our website at **www.alaris.com** or call **510-770-5700** Ext. 2669.

QuickVideo TRANSPORT

(Not that you would, but you could.)

alaris
Technology For Real People

TigerDirect
1-800-888-4437

COMPUSA DIRECT
1-800-669-4727

MicroWAREHOUSE
1-800-367-7080

CDW
1-800-800-4239

MICRO CENTER

Alaris, the Alaris Logo, QuickVideo and Videogram are trademarks of Alaris Incorporated. ©1997 Alaris Incorporated. All rights reserved.
All other trademarks are property of their respective companies.

CIRCLE 306 ON READER SERVICE CARD

More Fun on Twinsun

The cool and unusual sequel to Relentless is a great mix of action and adventure.

Twinsen's Odyssey

Once in a while, a game comes along that captures the imaginations and the keyboards of players, becoming an instant classic. Relentless: Little Big Adventure was one such game. The sequel, Twinsen's Odyssey, is even better.

The game runs under Windows 95 or DOS and requires a Pentium/60 with 8MB of RAM. It wouldn't run on our Pentium/90, however, and for better results we recommend at least a Pentium/133.

Twinsen's Odyssey follows the battles and explorations of Twinsen, the pin-headed hero of the story. This time, Twinsen must battle invading aliens who want to destroy Twinsun, his home planet, by stealing the very magic that keeps the perky residents happy and healthy. The aliens have captured Twinsun's wizards and are trying to force them to disclose all their secrets. To foil their plans, you're called upon not only to solve puzzles but to shoot, kick, and ax your way through islands, deserts, and moons.

If you've played Relentless, you'll notice that game play hasn't changed much. Twinsen has four modes of behavior: normal, aggressive, sporty, and discreet, which are appropriate for different situations—and it's still a joy to maneuver him via the keyboard. The world you explore is much larger than that of Relentless, and the characters you encounter along the way are fun to look at and speak with (though it can be a bit disconcerting to speak with a talking sausage).

Game play is surprisingly smooth, and the graphics are outstanding. We enjoyed most of the puzzles, which were difficult but not to the point of frustration. The combat portions of the game could have been better, since only a very steady hand has a chance at beating every foe on the first try. Targeting your weapons can be tricky, and novice players may need some practice with the controls.

Our only complaints about the game relate to its installation and setup. The title did not work properly the first time we installed it but worked fine on the second attempt. Also, the process takes a long time to complete.

Still, anyone who has played the original or loves good action and adventure games should find more than enough to enjoy in Twinsen's Odyssey.—*KJB*

Hard-Core Hardware

Flight sim fanatics will be happy to get their hands on this joystick.

ThrustMaster F-22 Pro

The ThrustMaster F-22 Pro is a heavy, well-constructed, beautifully designed, and highly programmable joystick for the hard-core flight simulation fan.

The metal base is lead-weighted, and the handle is filled with glass fibers, giving it a solid, balanced feel. The grip fits nicely in the palm, allows easy access to all the buttons, and has a lip on which you can rest your hand. The stick is governed by geared potentiometers for smooth motion with realistic resistance.

The stick bristles with buttons, including four four-way hat switches. The two-way trigger rests comfortably under the index finger and can be programmed for two functions: one when it is partially engaged and another when it is fully engaged. There's also an index button, thumb button, pinky switch, and paddle switch.

The F-22 Pro installs easily using a standard joystick cable and keyboard pass-through combination. The packaging, however, makes no mention of the F-22 Pro's need for adapter plugs with PS/2 keyboards. These plugs are not included, but ThrustMaster will send them to customers on request at no extra charge.

The driver software installs easily enough but could be simplified; it's about as intuitive as operating a nuclear reactor. If you can master the software, though, you'll find the F-22 Pro to be highly programmable. Any number of keystroke commands can be assigned to any button or any combination of buttons.

The stick lacks native Windows 95 drivers—the primary reason we gave the F-22 Pro four stars instead of five. Fortunately, ThrustMaster is aware of the deficiency and is coding new software that will soon be available. Once you match more intuitive software with the programmability and superb design elements, you'll have the ultimate hard-core flight peripheral.—*T. Liam McDonald*

Point. Click. Shop!

http://commerce.corel.com

CIRCLE 007 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/PRODLINK

In the future, monitors will be compact, powerful, and flexible — like the new Hyundai DeluxScan® reduced-depth monitor.

The 17% reduction in depth offered by the Hyundai DeluxScan HL7870S makes the promise of a small footprint monitor a reality. This revolutionary new display has the viewing area of a standard 17" monitor in a smaller, lighter package. Yet, its state-of-the-art technology gives you uncompromising performance and features, including 1280 x 1024 resolution, .27 dot pitch, and Advanced Digital On-Screen Controls — all at prices comparable with today's classic 17" monitors.

Experience the future with a new Hyundai DeluxScan reduced-depth monitor. ***It's the shape of things to come.***

For more information on the DeluxScan reduced-depth monitor, or any of the products in the DeluxScan monitor family, visit the Hyundai Web site at www.hea.com or call 1-800-568-0060.

A 17" monitor with the footprint of a 14" monitor.

Model	CRT/Viewable	Max Resolution	Controls	Dot Pitch	ESP*
14S	14"/13.2"	1024x768	Digital	.28	$189
15B	15"/13.7"	1024x768	Digital	.28	$249
17MS	17"/15.7"	1024x768	Digital	.39	$389
15G+	15"/13.7"	1280x1024	Digital On-Screen	.28	$299
17B+	17"/15.7"	1280x1024	Digital On-Screen	.28	$499
17S	17"/15.7"	1280x1024	Digital On-Screen	.27	$599

*Estimated street price 8/97. Dealer prices may vary. Does not include shipping and handling.

(800) 568-0060

www.hea.com

HYUNDAI

DeluxScan® Monitors

CIRCLE 167 ON READER SERVICE CARD

J&R COMPUTER WORLD

Corporate Leasing Available: 1-800-221-3191 (see below)

Scanners

Pacific Image ScanAce III
•8.5" x 14" flatbed scanner •36-bit color •Includes full Photoshop 4.0
$899.99 after $100 mail-in rebate (PCF ACEIIIPH PC) (rebate expires 10/31/97)
ScanAce II for PC w/ImagePals 2Go! (PCF ACEII) $349.99
ScanAce II for PC w/full Photoshop 4 (PCF ACEIIPH PC) $549.99

Data Storage

Iomega Zip™ Drive External 100MB Disk Drive
•Uses removable and replaceable Zip disks (200MB with compression)
$149.99 (IOM ZIP100PAR)
SyQuest EZFlyer 230 Ext. SCSI Drive (SYQ EZ230EXTPC) $199.99
Iomega Jaz 1GB Ext. SCSI Drive (IOM JAZEXTSCSI) $399.99
SyQuest SyJet 1.5GB Ext. Hard Drive (SYQ SYJET1SE-00) $499.99

Digital Cameras

Kodak DC120 Digital Color Camera
•Up to 1280 x 960 resolution •2MB internal memory holds 20 exposures •Viewfinder has 1.6" color LCD screen
$949.99 (KOD DC120)
Kodak DVC300 (KOD DVC300) $199.99
Minolta Dimage V with AC Adapter (MIN DIMAGE/KIT) $599.99
Sony DSC-F1 (SON DSC F1) $699.99

Toshiba Satellite 225CDS with 133MHz Pentium® Processor

•12.1" DSTN color
•16MB EDO RAM
•1.34GB hard drive
•10x CD-ROM drive
•16-bit stereo sound
•2MB video RAM
Lease for only $76.00 a month*
$1,899.99 (TOS PA1240U-S6C)

Compaq Presario 1680 Color Notebook with 200MHz Intel® Pentium® Processor and MMX™ technology

•12.1" TFT color LCD
•32MB SynchDRAM
•2.1GB hard drive
•20x CD-ROM drive
•33.6/14.4/56 modem w/ K56flex technology
Lease for only $168.00 a month*
$4,199.99 (CPQ 1680)

Toshiba Satellite Pro 445CDX with 133MHz Pentium® Processor and MMX™ technology

•12.1" FastScan color LCD display •16MB EDO RAM expands to 144MB •1.34GB hard drive •3.5" removable floppy drive •10x removable CD-ROM drive •16-bit stereo sound with .WAV and MIDI •2MB EDO video RAM
Lease for only $94.00 a month* **Super Price** (TOS PA1241U-H6C)

Toshiba Satellite Pro 445CDT
•133MHz Pentium Processor with MMX technology
•12.1" TFT color LCD •33.6Kbps voice/data/fax modem
Lease for only $116.00 a month* $2,899.99 (TOS PA1241U T6C)

The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corp

Hitachi VisionBook Plus 133MHz Notebook Computer

•12.1" high-addressing color STN LCD •1.44GB hard drive •Removable 1.44MB floppy drive, interchangeable with 10x CD-ROM drive •33.6/14.4 Kbps PCMCIA modem
$1,799.99 (HIT 4140)
Lease 4140 for only $72.00 a month! SEE DETAILS BELOW*

Hitachi VisionBook Plus
•150MHz version (HIT 4150X) $2,299.99

Hitachi Mx166T Color Notebook with 166MHz Intel® Pentium® processor with MMX™ technology

•16MB RAM plus FREE 32MB RAM for a total of 48MB RAM!
•2.1GB hard drive
•12.1" TFT active-matrix color display
•8x CD-ROM •2MB VRAM •33.6/14.4 modem
$2,999.99 (PNY PD3082A) (HIT MX166T-001)
Lease for only $120.00 a month! SEE DETAILS BELOW*

Hard Drives

Maxtor KO185120A IDE 5.1GB Hard Drive
•Great performance and plenty of room for all your storage needs
$379.99 (MXR KO185120A)
Seagate 2.5GB Hard Drive (SAG ST52520A) $229.99
Western Digital 3.1GB IDE HD (WD 3100RTL) $289.99
Maxtor 4.3GB IDE Internal HD (MXR KO184300A) $329.99

Targus Cases

Air Targus Universal Laptop Bag with Air Protection System
•APS puts a layer of pressurized air around your notebook for superior protection •Comes with extra pocket
$99.99 (TAR CUH1A)
Universal Bag with Foam Padding (TAR CUN1) $69.99
Black Notepac for Small Notebooks (TAR CN01) $39.99

Tripp Lite

Tripp Lite 675-Watt UPS Battery Backup System
•Power and fax/modem protection •Built-in noise filter •Tower design
$249.99 (TRL BC INT675)
Isobar 6 Ultra Surge Suppressor (TRL IBR6 ULT) $69.99
Master Touch Computer/Modem Surge Protection Control Center (TRL MT6+) $89.99

Edutainment Software

Magix Music Studio (3.0) $39.99

Walt Disney Ready For Math With Pooh $34.99

Collier's Encyclopedia 1998 by Sierra On-Line	$69.99
DaVinci's Machines, volume 1 by MicroForum	$29.99
Family Fun Pack by Sierra On-Line	$34.99
Highlights- Hidden Pictures by Mindscape	$29.99
Jumpstart 1st Grade- Reading by Knowledge Adv.	$29.99
Kindergarten Blaster by Davidson	$39.99
Land Designer 3D (4.5) by Sierra On-Line	$39.99
Math Workshop Deluxe- Active Mind by Broderbund	$29.99
Music Maker (3.0) by Magix	$39.99
Musician Plus by G-Vox	$119.99
Preschool Success Starter- Active Mind by Broderbund	$29.99
Ultimate Speed Reader by Davidson	$29.99

Business Software

Corel WordPerfect Suite 8 upgrade $139.99

IBM ViaVoice $99.99

Bookshelf 98 by Microsoft	$44.99
DriveCopy by PowerQuest	$29.99
Financial Consultant (1.11) for PalmPilot- Landware	$34.99
Home Essentials 97 upgrade by Microsoft	$99.99
Kai's Photo Soap by MetaCreations	$44.99
IntelliSynch for Palmpilot/Pilot by Puma	$49.99
Internet Phone (4.0) by Vocal Tech	$44.99
Naturally Speaking Dragon Systems	$199.99
Norton Anti-Virus Multi-Platform by Symantec	$69.99
Norton Utilities (2.0) by Symantec	$69.99
PaintShop Pro (4.0) by Jasc	$49.99
Partition Magic (3.0) by PowerQuest	$64.99

TravRoute Door-to-Door CoPilot $399.99

PC Anywhere 32 (8.0) by Symantec	$139.99
Quicken (6.0) by Intuit	$35.99
QuarkXPress (3.32) by Quark	$599.99
Uninstaller (4.5) by CyberMedia	$39.99
Virus Scan (3.0) by McAfee	$49.99
WinFax Pro (8.0) by Symantec	$99.99

To Order Toll Free and Receive a Free Catalogue

24 Hours, 7 Days, Anywhere In The USA

800-221-8180

PARK ROW • NEW YORK • NY • 10038 FAX: 1-800-232-4432

MAIL ORDERS: J&R Computer World, Dept. CP1007 • 59-50 Queens Midtown Expressway • Maspeth, Queens NY 11378
CALL 1-800-221-8180 for shipping information. DO NOT SEND CASH.

Not responsible for typographical or pictorial errors. Some quantities may be limited. All merchandise brand-new, factory-fresh and 100% guaranteed!

J&R COMPUTER WORLD

Named RETAILER OF THE YEAR by Computer Retail Week

HP Printers

HP OfficeJet 570
Printer/Fax/Copier/Scanner
•Color and black & white printing, up to 600 x 600 dpi •Fax mode with 20-page auto document feeder •OmniPage LE OCR software
$599.99 (HP C4643A)

HP LaserJet 5
LaserJet Printer
•600-dpi print resolution •12-ppm •4MB RAM •For Windows systems
$999.99 (HP C3916A)

Networking

Call us for all your network needs.

3Com
3-User Network Starter Kit
•Includes OfficeConnect 8-port hub, three Ethernet-III ISA 10Base-T cards, and three 50-ft RJ-45 UTP cables
$299.99 (3COM 3C509028)

NDC Network Starter Kit (2 users) (NDC ND772T) ..... $79.99, after $20 mail-in rebate (rebate expires 10/31/97)

3Com Etherlink III PCMCIA 10Base-T (3COM 3C5890-TP) $129.99

Compaq Presario 4528 MiniTower with 233MHz Intel® Pentium® Processor with MMX™ technology

•32MB RAM •3.2GB hard drive •24x CD-ROM •33.6/14.4 modem •Monitor required

Lease for only $72.00 a month!*

$1,799.99 (CPQ 4528)

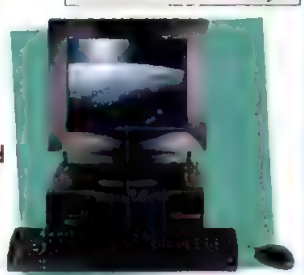
Compaq Presario 4508 MiniTower with 200MHz Intel® Pentium® Processor and MMX™ technology

•24MB SynchDRAM •3.2GB hard drive •16x CD-ROM drive •33.6 modem

Lease for only $60.00 a month!*

$1,499.99 (CPQ 4508)

Compaq Presario 2200 180MHz Multimedia Mini Desktop Computer



•16MB EDO RAM, upgradable to 80MB •1.6GB hard drive •8x CD-ROM drive •1.44MB diskette drive •33.6K/14.4 data/fax modem •64-bit 3D graphics with MPEG full-motion video •16-bit stereo •Integrated stereo speakers and Phantom subwoofer •Black chassis •Monitor required

$799.99 (CPQ 2200)

•Compaq V410 14" color monitor, 13.2" VIS, 0.28mm dot pitch, black ....(CPQ V410) $229.99

Video Cards

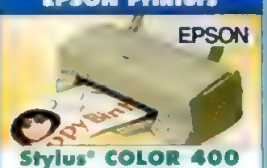
Matrox MGA Millennium
Windows Accelerator Card
•16.7 million colors @ 1280 x 1024 •4MB WRAM •Fits PCI slot
$199.99 (MOX 4MBPCIMGA)

Creative Labs Graphics Blaster 3D (CLN GB6381) $89.99

Matrox Mystique 220 (MOX MY220PB1Z2N) $139.99

ATI All-in-Wonder Video Card (ATI 4MBWONDER) $249.99

EPSON Printers



Stylus® COLOR 400
Ink Jet Printer
•720 x 720 dpi Photo Quality color and laser quality black text •Prints up to 4-ppm black and 3-ppm color
$199.99 (EPS STYLUS 400)

Stylus COLOR 600 •1440 dpi •6-ppm black, 4-ppm color (EPS STYLUS 600) $299.99

Stylus COLOR 800 •1440 dpi •8-ppm black, 7-ppm color (EPS STYLUS 800) $399.99

Monitors

Sony CPD-200SX
17" Trinitron Color Monitor
•15.9" viewable image •0.25mm dpi
$629.99 (SON 200SX)

Panasonic PanaMedia E50 (13.7" VIS) (PAN E50) $299.99

Sony CPD-100SX (13.9" VIS) (SON 100SX) $339.99

Panasonic PanaSync S70 (16" VIS) (PAN S70) $599.99

ViewSonic PT770 (16" VIS) (VTW PT770) $749.99

Hewlett-Packard Pavilion 8160 with 233MHz Intel® Pentium® processor with MMX™ technology

•32MB EDO RAM •6.0GB hard drive •24x CD-ROM drive •33.6/14.4 data/fax modem with K56Flex download •Monitor is not included

$1,899.99 (HP 8160)

Lease for only $71.00 a month! SEE DETAILS BELOW*

M50 •15" monitor ..(HP M50) ..$399.99

M70 •17" monitor ..(HP M70) ..$699.99

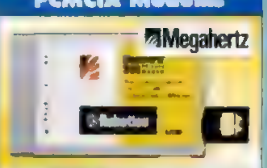
IBM® Aptiva® MiniTower with 233MHz Intel® Pentium® processor w/ MMX™ technology

•32MB EDO RAM •4.2GB hard drive •Built-in DVD player reads CD-ROMs •33.6/14.4 modem, upgradeable to 56K •Monitor sold separately

Super Price (IBM 2161-C3D)

Lease for only $92.00 a month! SEE DETAILS BELOW*

PCMCIA Modems



Megahertz XJ1560
PCMCIA XJACK 56K
•33.6 data, 14.4 fax, 56K Internet downloads (x2) •PCMCIA Type 2.1x
$269.99 (MHZ XJ1560)

US Robotics Sportster 33.6 PCMCIA (USR SP1336) $199.99

Motorola PCMCIA 33.6 Montana (MOT PCMC336MONT) $199.99

Megahertz PCMCIA XJACK 33.6 (MHZ XJ4336) $229.99

BUSINESS LEASING: No Money Down, No Payments for 30 Days!

1) Allows flexibility to add or upgrade equipment at any time
2) Conserves your capital
3) Saves time, credit decisions are quick and easy
4) Covers entire packages – equipment, software, service contracts, and peripherals

*All lease payments are exclusive of applicable taxes. Minimum leasing payment is $50 per month. All leases are subject to credit approval and require an administrative fee of $49.95 to be billed on the first payment. Leasing program administered by Dana Commercial Credit. Leases are Business Leases, $0 down, 36 month term with $1.00 purchase option.

Call J&R Corporate Sales
1-800-221-3191 or
1-212-238-9080
($1400 Minimum Lease Amount)

PC Game Controllers

ThrustMaster
Formula T-2 Driving Control
$129.99 (THR FORMULAT2)

Wizzard Pinball Controller (THR PINBALL) $19.99

Flight Control System Pro (THR FLIGHTPRO) $119.99

Rudder Control System (THR RUDDERPEDAL) $119.99

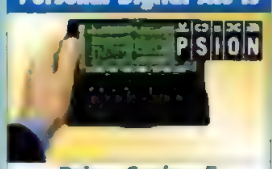
F-22 Pro Programmable Joystick (THR TMF22) $139.99

Apple® Macintosh®

Power Macintosh® 6500/250
•250MHz PowerPC 603e •48MB RAM •4.0GB HD •100MB Zip drive •12x CD-ROM •Requires monitor
$2,299.99 (APP M5612LL/A)

Power Macintosh® 6500/225
•225MHz PowerPC 603e processor •32MB •3GB HD •12x CD-ROM
$1,799.99 (APP M5611LL/A)

Personal Digital Ass'ts



Psion Series 5
Handheld Computer
•8MB RAM •Full VGA width touch sensitive screen with backlight
$699.99 (PSN SERIES5)

Sharp YO-430 Personal Organizer (SHA YO430) $69.99

Compaq C120 Personal Digital Ass't (CPQ C120) $299.99

U.S. Robotics Palm Pilot, Pro Ed. (USR 80201U) $399.99

Order Your Free Catalogue Now!

To Order Toll Free and Receive a Free Catalogue

24 Hours, 7 Days, Anywhere In The USA

800-221-8180

All Major Credit Cards Accepted

PARK ROW • NEW YORK • NY • 10038 FAX: 1-800-232-4432

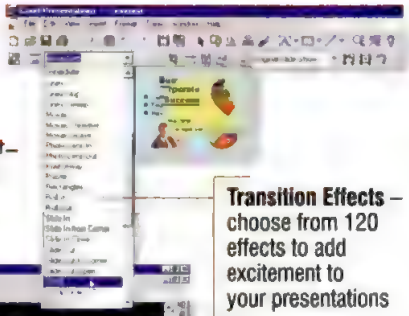
CIRCLE 295 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Corel® WordPerfect® Suite 8 is the Only Office Suite that Delivers Support for

MMX™ Technology†

DESIGNED FOR Intel MMX™

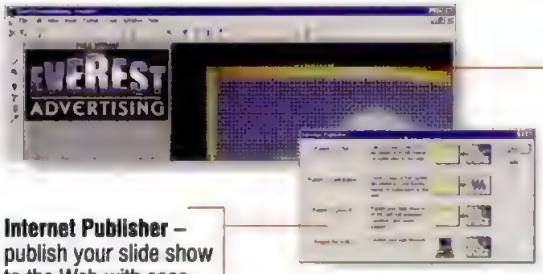
Support for MMX™ Technology† – accelerates slide transitions and drawing on computers with Intel Pentium® processors



Transition Effects – choose from 120 effects to add excitement to your presentations

Navigation Tabs – keep your bearings and move around quickly within your slide show

Import bitmap images directly into your chart



Edit bitmaps within Corel Presentations 8 to create desired special effects

Internet Publisher – publish your slide show to the Web with ease

Contact the reseller nearest you.

For graphically charged presentations that will electrify your audience, take advantage of Corel® Presentations™ 8—a powerful part of Corel® WordPerfect® Suite 8, the most innovative office software on the market. With all the great tools you've come to expect from your presentation software, plus features you won't find anywhere else, Corel Presentations 8 delivers showstopping results every time.

Presentation Features	Corel® Presentations™ 8	Microsoft® PowerPoint® 97
Support for MMX™ technology	✔	no
Publish to Java™ (Corel Barista™)	✔	no
QuickKeys™ keystroke actions (such as go to another slide, launch an application, play a sound, or even link to a URL)	✔	no
Add multiple slides simultaneously	✔	no
Import outlines into org. charts	✔	no
Customizable background gallery	✔	no
Slide navigation tabs	✔	no
Chart styles	✔	no
Range Highlighter used in datasheet	✔	no
Sort pie slices	✔	no
Separate drawing mode	✔	no
QuickWarp™ objects	✔	no
Blend objects together	✔	no
Place/Resize/Rotate chart	✔	no (must separate into objects)
Gradient fill (text and objects)	✔	objects only
Quick 3D any image	✔	drawing objects only
Slide transitions	120	41
Data chart functions (equations)	16	7

Corel® WordPerfect® Suite 8
Office Suite Excellence

BEST BUY
COMPUSA THE COMPUTER SUPERSTORE 1-800-COMPUSA
OfficeMax Taking Your Savings To The Max! 1-800-788-8080

$149.99* Competitive upgrade CD-ROM version

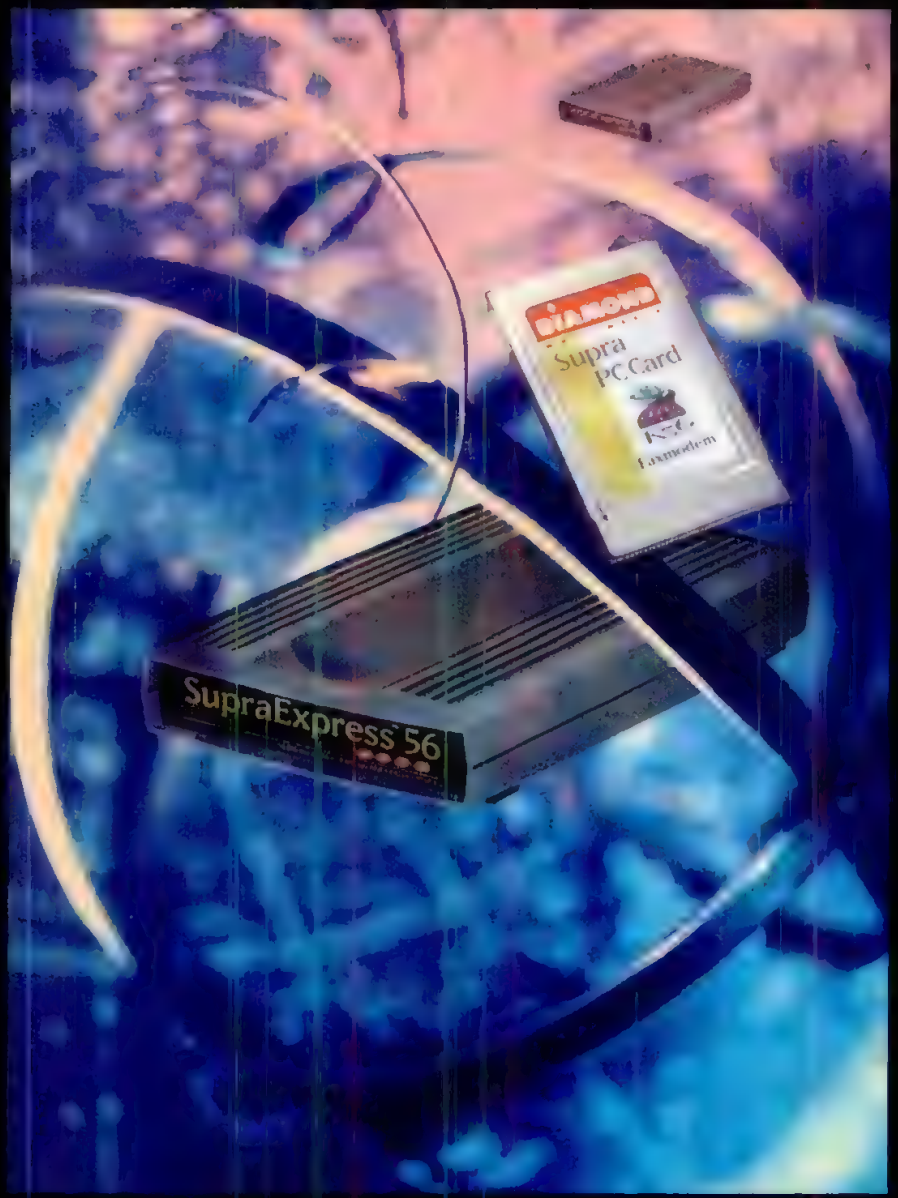
CorelWORLD CONFERENCES AND SEMINARS www.corel.com/corelworld

COREL www.corel.com
Call now for faxed literature!
1-613-728-0826 ext. 3080
Document # 1383

KUR-0462-US

†Intel Pentium processor not required to run Corel WordPerfect Suite 8; only necessary for users who want to take advantage of the suite's support for MMX technology.
*For upgrade version only. US$ plus applicable taxes and shipping. Dealer may sell for less. Prices may vary from store to store.

Copyright © 1997 Corel Corporation. All rights reserved. Corel, WordPerfect, Quattro, Presentations, CorelCENTRAL, QuickWarp, QuickKeys and the Corel balloon logo are trademarks or registered trademarks of Corel Corporation or Corel Corporation Limited. Microsoft and PowerPoint are registered trademarks of Microsoft Corporation. MMX, the MMX logo and Pentium are trademarks or registered trademarks of Intel Corporation. Java is a trademark of Sun Microsystems, Inc. All other product, font and company names and logos are trademarks or registered trademarks of their respective companies.



Presenting the 56K modems that didn't begin as 33.6 modems.

- NEW DATAPUMP & DAA
- FLASH ROM
- CUSTOMIZED FIRMWARE
- 4X SRAM PERFORMANCE
- DTE RATE TO 230 KBPS

"THE BEST COMBINATION OF FAST TRANSFER SPEEDS AND CONNECTION RATES"
- PC WEEK

Visit www.diamondmm.com/56 now to win a SupraExpress 56 modem!

SupraExpress and Supra PC Card 56 modems. Unlike other 56K modems, Diamond Multimedia's affordable family of 56K modems were engineered from the ground-up to deliver the optimal 56K performance. Instead of rebuilding existing 33.6 modems, we designed totally new components for 56K. Our new datapump, digital signal processor, and crystal are all faster than ever before. We've also added four times more SRAM to speed the process and we've doubled the DTE rate for the highest possible throughput. Finally, customized firmware optimizes each modem's speed and its ability to connect and stay connected. So call 1-800-727-8772 or visit us on the Web for the facts. Then prepare yourself to experience the ultimate in 56K.

DIAMOND MULTIMEDIA

Accelerate your world.

SupraExpress and Supra PC Card are trademarks of Diamond Multimedia Systems, Inc. All other trademarks are the property of their respective owners. ©1997 Diamond Multimedia Systems, Inc. All rights reserved.

ZD SOFTBANK ZIFF-DAVIS

BOOK
The Ben

PC MAGAZINE ONLINE

www.pcmag.com
At the top of discriminating bookmark lists everywhere.

EDITORS' CHOICES

Your link to the best of the best products in every category.

How do you want your information? Up-to-date... or up-to-the-minute? There's simply no more timely source for vital product information than PC Magazine Online.

In fact, with a dedicated staff of writers and editors who continuously refresh and up-date PC Magazine Online's content, this is as close to "live" as the industry gets.

At www.pcmag.com you'll also find other valuable resources that you can't get anywhere else — not even in PC Magazine. Industry news and trends literally as they are happening. Plus valuable multimedia

NEWSWATCH

What's happening today, and what it means — along with up-to-the minute news streamed from the industry press.

INSITES

HARD-HITTING OPINIONS, AND SAVVY WEB INSIGHTS FROM MICHAEL J. MILLER (EDITOR-IN-CHIEF), DON WILLMOTT (EXECUTIVE EDITOR, ONLINE), PLUS "NEWS, VIEWS AND SNIDE ASIDES" FROM JOHN C. DVORAK.

w . p c m a g . c o m w w w . p c m a g . c o m w w w . p

MARK chmark.

InternetUser

The most complete and current guide to Internet software and tools — an indispensable resource for any serious Netizen.

content that seamlessly complements and enhances the print edition, and makes it easy (even fun) to dig out that exact nugget of information you need.

Take advantage of customizable product comparisons and interactive navigation tools that streamline product selection.

Follow-up links to earlier PC Magazine articles. And, of course, stay a step ahead of the pack on the very latest hardware, software and technology developments.

So drop in, any time — but plan to stay awhile. You'll find lots of good reasons to add one more URL to your "daily" folder: www.pcmag.com.

PCLABS Online

ALL THE GOOD STUFF YOU EXPECT FROM PC LABS, WITH INTERACTIVE FEATURES THAT MAKE IT EVEN EASIER TO DRILL DOWN TO THE INFORMATION YOU NEED

PC MAGAZINE

THE BENCHMARK

mag.com www.pcmag.com www.pcmag

Editorial Product Index

Reader Service No.	Product	Company	Page
441	AcerView 76c	Acer America Corp.	111
442	ADI MicroScan 5G	ADI Systems Inc.	111
407	Adobe Dimensions 3.0	Adobe Systems Inc.	62
407	Adobe Illustrator 7.0	Adobe Systems Inc.	62
516	Adobe Premiere 4.2	Adobe Systems Inc.	180
407	Adobe Streamline 4.0	Adobe Systems Inc.	62
498	All-in-Wonder/ATI PC-TV	ATI Technologies Inc.	189
443	AOC Spectrum 7GIr	AOC International (USA) Ltd.	111
444	ArtMedia TN1885T	ArtMedia USA	112
445	ATM Sylvania Precision S730A	ATM (Advanced Technology Marketing)	112
499	AzeenaVision 500	Azeena Technologies Inc.	190
545	Basic Mini Firewall	Computer Peripherals Systems Inc.	NE14
484	Bazaar Analyzer Pro	Aquas Inc.	254
491	Boca Video Phone Kit	Boca Research Inc.	222
542	Cisco PIX	Cisco Systems Inc.	NE6
	Compaq V70	Compaq Computer Corp.	112
407	Connectix Color QuickCam 2	Connectix Corp.	62
447	Continental DiGiview 1709D	Continental Technology Inc.	112
513	Corel Lumiere Suite 1.0	Corel Corp.	166
448	Cornerstone Color 45/101sf	Cornerstone Imaging Inc.	148
449	CTX EX700	CTX International Inc.	116
449	CTX VL710	CTX International Inc.	116
521	CVideoNow 1.2 beta 1	Cubic Videocomm Inc.	234
450	CyberVision ds86D	CyberVision	129
507	Darim MPEGator	Darim Co. Ltd.	204
509	Data Translation Broadway	Data Translation Inc.	205
451	Daytek DT-1731D	Daytek Electronics Corp.	129
410	Dell Inspiron 3000 M233xt	Dell Computer Corp.	45
452	Dell UltraScan 1000HS	Dell Computer Corp.	129
453	Delta DB-770KA	Delta Products Corp.	129
492	Diamond Supra Video Phone Kit 3000	Diamond Multimedia Systems Inc.	226
500	Digital Video Arts WakeBoard	Digital Video Arts Ltd.	190
406	Door-to-Door CoPilot	TravRoute Software	76
505	DPS Spark	DPS Inc.	212
510	DV Studio Apollo2 MPEG-1 and Decoder	DV Studio Inc.	208
454	EIZO Nanao FlexScan FX-C6	EIZO Nanao Technologies Inc.	129
454	EIZO Nanao FlexScan TX-C7	EIZO Nanao Technologies Inc.	129
545	Enforcer	Computer Peripherals Systems Inc.	NE14
501	FAST Electronics AV Master	FAST Electronics U.S. Inc.	192
411	Fujitsu LifeBook 585Tx	Fujitsu PC Corp.	45
493	Galant InterVision Pro	Gallant Computer Inc.	227
455	Gateway 2000 EV700	Gateway 2000 Inc.	130
455	Gateway 2000 EV900	Gateway 2000 Inc.	153
412	Gateway 2000 Solo 9100	Gateway 2000 Inc.	45
456	Hansol 700P	Hansol MultiTech Inc.	130
457	Hewlett-Packard Ultra VGA 1280	Hewlett-Packard Co.	131
485	Hit List Pro 3.5	MarketWave	255
403	HP M900	Hewlett-Packard Co.	73
458	Hyundai DeluxScan 17B+	Hyundai Electronics America Inc.	131
459	IBM G72	IBM Corp.	134
413	IBM ThinkPad 770	IBM Personal Computer Co.	45
486	IIS Assistant	MediaHouse Software Inc.	258
460	iiyama VisionMaster Pro 17	iiyama North America Inc.	135
502	Intel Smart Video recorder III	Intel Corp.	196
508	Intel Video Phone 2.0	Intel Corp.	222
461	KDS Visual Sensations VS-9	KDS USA	136
404	Kodak DVC 300	Eastman Kodak Company	73
517	Kohesion 1.0	in:sync Corp	182
511	LA Vision Snazzi	LA Vision Inc.	208
462	LG GoldStar Studioworks 78D	LG Electronics U.S.A. Inc.	137
543	Livingston FireWall IRX	Livingston Enterprises Inc.	NE8
463	MAG DJ707	MAG InnoVision Co. Inc.	137
463	MAG DJ717	MAG InnoVision Co. Inc.	137
401	Mathcad Professional, Version 7.0	MathSoft Inc.	66
503	Matrox Rainbow Runner Studio	Matrox Graphics Inc.	196
518	MediaStudio Pro 5.0	Ulead Systems Inc.	185
544	Meta IP 3.0	MetaInfo Inc.	NE13
514	MGI VideWave	MGI Software Corp.	168
414	Micron TransPort XKE	Micron Electronics Inc.	45
522	Microsoft NetShow 2.0 beta	Microsoft Corp.	237
504	miroVideo DC20 plus	miro Computer Products Ltd.	198
504	miroVideo DC30 plus	miro Computer Products Ltd.	198
506	miroVideo DV 100	miro Computer Products Ltd.	213
464	Mitsubishi Diamond Pro 87TXM	Mitsubishi Electronics America Inc.	137
465	NEC MultiSync A700	NEC Technologies Inc.	140
465	NEC MultiSync E700	NEC Technologies Inc.	140
415	NEC Versa 6230	NEC Technologies Inc.	45
487	NetIntellect 2.5	WebManage Technologies Inc.	260
488	NetStats Pro	Insanely Great Software	260
489	NetTracker Professional	Sane Solutions	262
466	Nokia Multigraph 447Za	Nokia Display Products Inc.	141
467	NSA/Hitachi SuperScan Elite 751	NSA/Hitachi	153
512	Optibase MPEG ShowSite	Optibase	210
468	Optiquest V773	Optiquest	141
494	Panasonic EggCam GP-KR0011	Panasonic Computer Peripheral Co.	229
469	Panasonic PanaFlat PF70	Panasonic Computer Peripheral Co.	141
469	Panasonic PanaSync S70	Panasonic Computer Peripheral Co.	141
470	Philips 107B	Philips Consumer Electronics Co.	142
470	Philips Brilliance 109	Philips Consumer Electronics Co.	153
471	PiXie 995	PiXie Technologies Inc.	156
471	PiXie PBC-7164	PiXie Technologies Inc.	142
515	Presto! VideoWorks	NewSoft Inc.	172
472	Princeton EO72	Princeton Graphic Systems	142
472	Princeton EO90	Princeton Graphic Systems	156
416	Quantex Meridian H 1330	Quantex Microsystems Inc.	45
523	RealVideo 4.0	Progressive Networks Inc.	238
405	Retki MetroGuide 2.0 for Windows 95	Liikkuva Systems	76
473	Sampo AlphaScan 750	Sampo Technology Inc.	142
473	Sampo AlphaScan 810	Sampo Technology Inc.	157
474	Samsung SyncMaster 700b	Samsung Electronics America Inc.	144
474	Samsung SyncMaster 700p	Samsung Electronics America Inc.	144
475	Sceptre P75A	Sceptre Technologies Inc.	144
541	Secure Access Firewall	Ascend Communications Inc.	NE2
476	Shamrock C705T	Shamrock Peripherals Inc.	144
477	Shinho AV2 765F	Shinho Electronics & Communications Inc.	144
478	Smile CB6736SL	Smile International Inc.	146
479	Sony Multiscan 200sf	Sony Electronics Inc.	146
479	Sony Multiscan 200sx	Sony Electronics Inc.	146
479	Sony Multiscan 220vs	Sony Electronics Inc.	146
524	StreamWorks 3.0.252 beta	Xing Technology Inc.	238
495	Tekram How-R-U Video Conferencing Kit	Tekram Technology	231
480	TeleVideo SVP260	TeleVideo Inc.	146
496	3Com Bigpicture Video Kit 1622	3Com Corp.	231
417	Toshiba Tecra 750CDT	Toshiba America Information Systems Inc.	45
481	Toshiba TekBright 700PM	Toshiba America Information Systems Inc.	148
525	TrueStream 1.1 beta 19	Motorola Inc.	242
482	Utobia XP400	Utobia Corp.	148
526	VDOLive 2.1	VDOnet Corp.	244
497	ViaTV Phone VC100	8x8 Inc	227
408	Video Blaster WebCam	Creative Labs Inc.	62
483	ViewSonic G771	ViewSonic Corp.	148
483	ViewSonic PT775	ViewSonic Corp.	148
527	VivoActive 2.0	VivoActive Software Inc.	248
528	Vosaic MediaSuite 1.04	Vosaic LLC	251
490	WebTrends 3.5	e.g. Software Inc.	263
402	YoYo	Big Island Communications Inc.	68

NE—Network Edition.
For information about the Network Edition of *PC Magazine*, call Circulation at 800-289-0429.

Advertisers' Index

COMPANIES

Reader Service No.	Advertiser	Page
226	ADI Systems Inc.	80 @
235	AMS Tech	41 @
122	AST Research	59
059	ATI Technologies	209 @
134	01 Communique Laboratory	270 @
*	3 Com Corporation	NE3
087	Acer Peripherals America	92 @
092	Acer America	138-139 @
274	Adobe Systems Inc.	279
064	Advanced Logic Research	298 W95 @
306	ALARIS	390
093	AMBICOM, INC.	273
342	American Power Conversion	201-203 @
341	American Power Conversion	385-387 @
*	Avery Dennison	300 W95
186	BayNetworks Internet CPE Division	264 @
292	Caere Corporation	8 @
009	Cambridge Soundworks	94 @
177	Cardiff Software	258 W95
311	CIRQUE CORPORATION	183 @
*	Compaq Computer Corporation	74-75
*	Compaq Computer Corporation	147
*	Compaq Computer Corporation	184-185
*	CompUSA Direct	333-337
903	Computer Associates	NE15
360	COMPUTER DISCOUNT WAREHOUSE	98-99 @
188	COMPUTER DISCOUNT WAREHOUSE	100-101 @
147	COMPUTER DISCOUNT WAREHOUSE	102-103 @
160	COMPUTER DISCOUNT WAREHOUSE	104-105 @
121	COMPUTER DISCOUNT WAREHOUSE	308-309 @
159	COMPUTER DISCOUNT WAREHOUSE	310-311 @
109	COMPUTER DISCOUNT WAREHOUSE	312-313 @
158	COMPUTER DISCOUNT WAREHOUSE	314-315 @
129	COMPUTER DISCOUNT WAREHOUSE	316-317 @
318	COMPUTER DISCOUNT WAREHOUSE	318 @
011	Corel Corporation	132-133 @
041	Corel Corporation	280 @
332	Corel Corporation	389 @
037	Corel Corporation	392 @
207	Corel Corporation	398 @
026	Creative Labs	143 @
040	Creative Labs	145 @
095	Creative Labs	181 @
120	Crucial Technology	67 @
294	Cyber Media	274 @
343	Cyrix Corporation	38-39
248	Data Translation, Inc.	14 @
102	DataViz	306 W95 @
*	Dell Computer Corporation	C5-C8
*	Dell Computer Corporation	NE12
*	Dell Computer Corporation	78-79
*	Dell Computer Corporation	154-155
*	Dell Computer Corporation	246-247
*	Dell Computer Corporation	256-257
*	Dell Computer Corporation	331
*	Diamond Multimedia Systems	399
*	DIGITAL EQUIPMENT CORP.	54-55
*	DIGITAL EQUIPMENT CORP.	216-217
283	Dirt Cheap Drives	321 @
*	EIZO NANAO Technologies, Inc.	96
004	Epson America	12-13 @
005	Epson America	156-157 @
211	Executive Software	293 W95 @
272	First Source International	348 @
*	Gateway 2000	48A-48P
063	Helix Software Co.	296-297 W95 @
*	Hewlett Packard	191
*	Hewlett Packard	193
*	Hewlett Packard	195
*	Hewlett Packard	239
*	Hewlett Packard Peripherals	224-225
140	Hitachi	290 W95 @
143	Hitachi PC Corporation	82-83
167	Hyundai Electronics	393
*	IBM Corporation	20
*	IBM Corporation	111
*	IBM Corporation	213
*	Imation	243
390	In Focus Systems	292 W95 @
278	Insight Direct	322-323 @
*	Intel Corporation	15
*	Intel Corporation	117
*	Iomega Corporation	250-251
295	J&R Music World	394-397 @
335	JavaSoft	60-61 @
170	KDS USA	382
106	Kingston Technology	228
019	L.A. Trade	330 @
*	Leapfrog Lab Inc.	338-339
130	MGI Software Corporation	301 W95 @
299	McAfee Associates, Inc.	44
144	Macromedia	291 W95
039	Mag InnoVision	18-19 @
380	Matrox Graphics Inc.	162-163
855	Micro Solutions Computer Products	346 @
003	Micro Warehouse	340-341 @
145	Microcom	164 @
*	Micrografx	69
203	Micron Electronics	5 @
119	Micron Electronics	16-17 @
013	Micron Electronics	36A-36J @
*	Microsoft	2-3
*	Microsoft	56-57
010	Midwest Computer Works	344 @
012	Mindscape	388 @
089	Mindspring	268 @
036	Mitac International	283
280	Mitsubishi Electronic America, Inc.	295 W95 @
107	NEC Computer Systems	C2-C4, p1
153	NEC Computer Systems	31-34
154	NEC Computer Systems	86
157	NEC Computer Systems	125-128
155	NEC Computer Systems	236
156	NEC Computer Systems	259
149	NetObjects	267
086	NewSoft, Inc.	287
*	Novell, Inc.	178-179
117	Optiquest	158 @
*	Oracle Corp.	11
047	PC Connection	342-343
330	PC Mall	324-325 @
080	PC Power and Cooling	94 @
*	PCs Compleat	333-337
068	PC Zone	328-329 @
022	PK Electronics	223
014	Paragon	320 @
220	Philips Electronics	218 @
021	Phillips Business Electronics	245
*	Pitney Bowes, Inc	302 W95
193	Play Inc.	53 @
125	PowerQuest	299 W95 @
176	PowerQuest Corp.	84 @
031	Princeton Graphic Systems	276-277 @
287	ProGen Systems	90-91 @
132	Proxima	289 W95
074	Quantex	113-115 @
880	Quarterdeck Office Systems	NE5
*	Ringdale	NE8
309	S.A.G./Storage Solutions	22-23 @
*	SPSS, Inc.	345
033	Samsung Electronics	215
146	Sceptre Technologies	284 W95
871	Seagate Software	NE7 @
271	Seagate Technology	232 @
142	Sejin America	304 W95
352	Softbank Expos	349
*	Sony Computer Peripherals	88
909	Standard Microsystems Corp.	NE10-NE11
316	Sys Technology	303 W95
174	Techmedia	249 @
*	Tektronix Inc.	26-27
060	TeleVideo	252 W95
066	TigerDirect	407 @
378	Toshiba America	211
379	Toshiba Japan	120
088	Traveling Software	305 W95 @
860	Trend Micro	NE16
242	UMAX Technology	70-72
055	Unicent	169-171
043	Unisys Corporation	173-176 @
008	Unisys Corporation	206-207 @
006	Unisys Corporation	214 @
*	US Robotics Inc.	50-51
*	US Robotics Inc.	149-152
051	USA Flex	347 @
*	USR Mobile Communications Corp.	197
*	USR Mobile Communications Corp.	199
243	Viagrafix	288 W95 @
118	ViewSonic	64-65 @
298	ViewSonic	230 @
*	Visioneer	186
065	VisionTek	43
192	White Pine Software Inc.	272 @
085	Winbook	77 @
*	Xircom	25
*	ZD Net	97

*No Reader Service#.Please Call Advertiser For More Information.

Advertisers' Index

PRODUCTS

Reader Service No.	Company	Product	Page
	ACCELERATOR BOARDS		
•	Imation	Travan DT	243
•	USR Mobile Communications Corp	Modem Card	197
•	USR Mobile Communications Corp	Accelerator Boards	199
	ADD-ON BOARDS		
059	ATI Technologies	ATI Xpert	209
026	Creative Labs	PC-DVD	143
040	Creative Labs	Speakers	145
095	Creative Labs	AWE 64 Gold Card	181
248	Data Translation, Inc.	Broadway	14
	ANTI-VIRUS SORTWARE		
299	McAfee Associates, Inc.	ViruScan	44
	AUDIO BOARDS		
026	Creative Labs	PC-DVD	143
040	Creative Labs	Speakers	145
095	Creative Labs	AWE 64 Gold Card	181
	BACKUP SOFTWARE		
342	American Power Conversion	Smart-UPS	201-203
341	American Power Conversion	Back-UPS Office	385-387
220	Philips Electronics	Velo	218
	BOOKS		
•	CompUSA Direct	Mail Order	333-337
•	PCs Compleat	Mail Order	333-337
	CD-ROM		
•	IBM Corporation	World Book Multimedia Encyclopedia	111
220	Philips Electronics	Velo	218
	CHIPS/PROCESSORS		
106	Kingston Technology	Memory	228
	COMMUNICATIONS SOFTWARE		
134	01 Communique Laboratory	Communicate!	270
145	Microcom	Carbon Copy	164
871	Seagate Software	Seagate Software-NSMG	NE7
192	White Pine Software, Inc.	MeetingPoint Conference Server Software	272
	COMPUTERS/COMPATIBLES		
235	AMS Tech	Rodeo Notebooks	41
•	Compaq Computer Corporation	Notebooks Direct	147
•	Compaq Computer Corporation	Presario	184-185
•	Compaq Computer Corporation	Desktop Computers	74-75
•	CompUSA Direct	Mail Order	334-337
188	COMPUTER DISCOUNT WAREHOUSE	Hardware	100-101
147	COMPUTER DISCOUNT WAREHOUSE	Hardware	102-103
160	COMPUTER DISCOUNT WAREHOUSE	Hardware	104-105
121	COMPUTER DISCOUNT WAREHOUSE	Hardware	308-309
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	310-311
109	COMPUTER DISCOUNT WAREHOUSE	Hardware	312-313
158	COMPUTER DISCOUNT WAREHOUSE	Hardware	314-315
129	COMPUTER DISCOUNT WAREHOUSE	Hardware	316-317
318	COMPUTER DISCOUNT WAREHOUSE	Hardware	318
360	COMPUTER DISCOUNT WAREHOUSE	Hardware	98-99
343	Cyrix Corporation	Microprocessor	38-39
•	Dell Computer Corporation	Dimension and Latitude	C5-C8
•	Dell Computer Corporation	Workstation	154-155
•	Dell Computer Corporation	Latitude	246-247
•	Dell Computer Corporation	Dimension	256-257
•	Dell Computer Corporation	Dimension and Latitude	331
•	Dell Computer Corporation	Dimension	78-79
•	DIGITAL EQUIPMENT CORP	Alpha PCs	216-217
•	DIGITAL EQUIPMENT CORP	Branding Campaign	54-55
272	First Source International	Memory, Notebooks, Peripherals	348
•	Hewlett Packard	NetServer	191
•	Hewlett Packard	Desktop PCs	193
143	Hitachi PC Corporation	Hitachi VisionBook Pro Notebooks	82-83
•	IBM Corporation	Aptiva PCs	20
295	J&R Music World	Systems, Hardware, Peripherals	394-397
•	Leapfrog Lab Inc	PCs/Notebooks/Upgrades	338-339
003	Micro Warehouse	Notebooks, desktop and monitor	340-341
119	Micron Electronics	Transport	16-17
013	Micron Electronics	Micron Family of Products	36A-36J
203	Micron Electronics	Service and Support	5
010	Midwest Computer Works	Reseller, Mail Order, Hardware, PCs	344
107	NEC Computer Systems	NEC NOW	C2-C4, p1
153	NEC Computer Systems	NEC NOW	31-34
154	NEC Computer Systems	NEC VERSA	86
047	PC Connection	PCs, Peripherals, Software	342-343
068	PC Zone	Mail Order	328-329
•	PCs Compleat	Mail Order	334-337
287	ProGen Systems	Desktop Computers	90-91
074	Quantex	Quantex Systems	113-115
309	S.A.G./Storage Solutions	Servers and Storage	22-23
174	Techmedia	Desktop	249
066	TigerDirect	Notebook, Desktop, Hard Drive, Reseller	407
378	Toshiba America	Notebook Computers	211
051	USA Flex	Hardware, Software, Peripherals	347
242	UMAX Technology	Computer	70-72
055	Unicamt	Systems, Mail Order	169-171
008	Unisys Corporation	Aquanta Servers	206-207
006	Unisys Corporation	Aquanta Servers	214
085	Winbook	XP5 Pro and FX Notebooks	77
	DATA BASE MANAGERS		
•	Oracle Corp.	Oracle InterOffice	11
	DATA CARTRIDGES		
014	Paragon	Infinity	320
	DESK TOP PUBLISHING		
•	Micrografx	Flowcharter 7	69
	DIAGNOSTIC SOFTWARE		
294	Cyber Media	First Aid '97	274
	DIGITAL CAMERAS		
•	Hewlett Packard Peripherals	PhotoSmart	224-225
•	Intel Corporation	Team Station	117
•	Sony Computer Peripherals	Digital Still Camera	88
	DISK BACKUP & TAPE DRIVES		
•	Iomega Corporation	Jaz	250-251
855	Micro Solutions Computer Products	Bantam CD ROM	346
220	Philips Electronics	Velo	218

Reader Service No.	Company	Product	Page
	DISPLAY PANELS/PROJECTORS		
005	Epson America	Epson Projectors	156-157
155	NEC Computer Systems	NEC LCD Monitor Display	236
156	NEC Computer Systems	NEC MT Projector FY '97	259
132	Proxima	Projector	289
033	Samsung Electronics	Samsung Monitors	215
298	ViewSonic	ViewSonic PJ800 LCD Projector	230
	EDUCATIONAL SOFTWARE		
011	Corel Corporation	Wordperfect Suite 8 Pro/Netscape	132-133
041	Corel Corporation	Matrix	280
332	Corel Corporation	Draw 7	389
037	Corel Corporation	Galleria	392
207	Corel Corporation	CWPS8 Presentations	398
•	IBM Corporation	World Book Multimedia Encyclopedia	111
155	NEC Computer Systems	NEC LCD Monitor Display	236
	ENTERTAINMENT SOFTWARE		
011	Corel Corporation	Wordperfect Suite 8 Pro/Netscape	132-133
041	Corel Corporation	Matrix	280
332	Corel Corporation	Draw 7	389
037	Corel Corporation	Galleria	392
207	Corel Corporation	CWPS8 Presentations	398
•	IBM Corporation	World Book Multimedia Encyclopedia	111
	FAX SOFTWARE		
134	01 Communique Laboratory	Communicate!	270
	FINANCIAL PLANNING SOFTWARE		
•	Microsoft	Microsoft Money	56-57
	GRAPHICS SOFTWARE		
292	Caere Corporation	OmniForm	8
011	Corel Corporation	Wordperfect Suite 8 Pro/Netscape	132-133
041	Corel Corporation	Matrix	280
332	Corel Corporation	Draw 7	389
037	Corel Corporation	Galleria	392
207	Corel Corporation	CWPS8 Presentations	398
•	Micrografx	Flowcharter 7	69
	HAND-HELD PCS		
•	Hewlett Packard	Palmtops	195
	HARD DRIVES		
283	Dirt Cheap Drives	Mass Storage	321
•	Iomega Corporation	Jaz	250-251
019	L.A. Trade	Memory, Hard Drives, PCMCIA	330
014	Paragon	Infinity	320
176	PowerQuest Corp	Drive Image	84
271	Seagate Technology	Data Storage	232
	HARDWARE		
•	3 Com Corporation	10/100 Ethernet Adapters	NE3
235	AMS Tech	Rodeo Notebooks	41
093	AMBICOM, INC	Network Interface Card	273
186	BayNetworks Internet CPE Division	Instant Internet	264
311	CIRQUE CORPORATION	Power Cat Touchpad	183
•	Compaq Computer Corporation	Notebooks Direct	147
•	Compaq Computer Corporation	Presario	184-185
•	Compaq Computer Corporation	Desktop Computers	74-75
026	Creative Labs	PC-DVD	143
040	Creative Labs	Speakers	145
095	Creative Labs	AWE 64 Gold Card	181
120	Crucial Technology	Micron Memory Upgrades	67
343	Cyrix Corporation	Microprocessor	38-39
•	Dell Computer Corporation	Dimension and Latitude	C5-C8
•	Dell Computer Corporation	Latitude	246-247
•	Dell Computer Corporation	Dimension	256-257
•	Dell Computer Corporation	Dimension and Latitude	331
•	Dell Computer Corporation	Dimension	78-79
•	Diamond Multimedia Systems	56K Modem	399
•	DIGITAL EQUIPMENT CORP	Alpha PCs	216-217
•	DIGITAL EQUIPMENT CORP	Branding Campaign	54-55
283	Dirt Cheap Drives	Mass Storage	321
143	Hitachi PC Corporation	Hitachi VisionBook Pro Notebooks	82-83
•	IBM Corporation	Aptiva PC's	20
•	Imation	Travan DT	243
•	Intel Corporation	Networking Products Division	15
•	Iomega Corporation	Jaz	250-251
295	J&R Music World	Systems, Hardware, Peripherals	394-397
106	Kingston Technology	Memory	228
•	Leapfrog Lab Inc	PCs/Notebooks/Upgrades	338-339
003	Micro Warehouse	Hardware, Software, Peripherals	340-341
119	Micron Electronics	Transport	16-17
013	Micron Electronics	Micron Family of Products	36A-36J
036	Mitac International	Mitac 5026	283
117	Optiquest	Optiquest V95 19" Monitor	158
330	PC Mall	Hardware, Software, Peripherals	324-325
068	PC Zone	Mail Order	328-329
014	Paragon	Infinity	320
074	Quantex	Quantex Systems	113-115
309	S.A.G./Storage Solutions	Servers and Storage	22-23
033	Samsung Electronics	Samsung Monitors	215
174	Techmedia	Desktop	249
•	Tektronix Inc.	Graphic Printing and Imaging	26-27
066	TigerDirect	Notebook, Desktop, Hard Drive, Reseller	407
378	Toshiba America	Notebook Computers	211
379	Toshiba Japan	Microfilter	120
051	USA Flex	Hardware, Software, Peripherals	347
008	Unisys Corporation	Aquanta Servers	206-207
006	Unisys Corporation	Aquanta Servers	214
298	ViewSonic	ViewSonic PJ800 LCD Projector	230
118	ViewSonic	ViewSonic PT775/GT775 Monitors	64-65
	HUBS		
•	Intel Corporation	Networking Products Division	15
909	Standard Microsystems Corp.	TigerStack Hub	NE10-NE11
	IMAGE EDITING SOFTWARE		
248	Data Translation, Inc.	Broadway	14
380	Matrox Graphics Inc.	Rainbow Runner	162-163
•	Visioneer	PaperPort Deluxe	186
	INTERNET		
134	01 Communique Laboratory	Communicate!	270
186	BayNetworks Internet CPE Division	Instant Internet	264
335	JavaSoft	JavaSoft	60-61
089	Mindspring	Internet Access	268
149	NetObjects	Web Builder	267

Advertisers' Index

PRODUCTS

Reader Service No.	Company	Product	Page
LABEL/FORM SOFTWARE			
292	Caere Corporation	OmniForm	8
LAN ADAPTER BOARDS			
*	Intel Corporation	Networking Products Division	15
*	Xircom	Ethernet	25
LAPTOP/PORTABLE COMPUTERS			
235	AMS Tech	Rodeo Notebooks	41
122	AST Research	Ascentia Mirror Notebook	59
*	Compaq Computer Corporation	Notebooks Direct	147
*	Compaq Computer Corporation	Presario	184-185
*	Compaq Computer Corporation	Desktop Computers	74-75
*	CompUSA Direct	Mail Order	333-337
188	COMPUTER DISCOUNT WAREHOUSE	Laptops	100-101
147	COMPUTER DISCOUNT WAREHOUSE	Laptops	102-103
160	COMPUTER DISCOUNT WAREHOUSE	Laptops	104-105
121	COMPUTER DISCOUNT WAREHOUSE	Laptops	308-309
159	COMPUTER DISCOUNT WAREHOUSE	Laptops	310-311
109	COMPUTER DISCOUNT WAREHOUSE	Laptops	312-313
158	COMPUTER DISCOUNT WAREHOUSE	Laptops	314-315
129	COMPUTER DISCOUNT WAREHOUSE	Laptops	316-317
318	COMPUTER DISCOUNT WAREHOUSE	Laptops	318
360	COMPUTER DISCOUNT WAREHOUSE	Laptops	98-99
*	Dell Computer Corporation	Latitude	246-247
*	Dell Computer Corporation	Dimension and Latitude	331
272	First Source International	Memory, Notebooks, Peripherals	348
*	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	48A-48P
143	Hitachi PC Corporation	Hitachi VisionBook Pro Notebooks	82-83
295	J&R Music World	Systems, Hardware, Peripherals	394-397
003	Micro Warehouse	Notebooks, desktop and monitor	340-341
010	Midwest Computer Works	Reseller, Mail Order, Hardware, PC's	344
036	Mitac International	Mitac 5025	283
068	PC Zone	Mail Order	328-329
*	PCs Compleat	Mail Order	333-337
287	ProGen Systems	Notebook Computers	90-91
378	Toshiba America	Notebook Computers	211
051	USA Flex	Hardware, Software, Peripherals	347
008	Unisys Corporation	Aquanta Servers	206-207
006	Unisys Corporation	Aquanta Servers	214
085	Winbook	XP5 Pro and FX Notebooks	77
LOCAL AREA NETWORKING			
*	3 Com Corporation	10/100 Ethernet Adapters	NE3
186	BayNetworks Internet CPE Division	Instant Internet	264
188	COMPUTER DISCOUNT WAREHOUSE	Networking Products	100-101
147	COMPUTER DISCOUNT WAREHOUSE	Networking Products	102-103
160	COMPUTER DISCOUNT WAREHOUSE	Networking Products	104-105
121	COMPUTER DISCOUNT WAREHOUSE	Networking Products	308-309
159	COMPUTER DISCOUNT WAREHOUSE	Networking Products	310-311
109	COMPUTER DISCOUNT WAREHOUSE	Networking Products	312-313
158	COMPUTER DISCOUNT WAREHOUSE	Networking Products	314-315
129	COMPUTER DISCOUNT WAREHOUSE	Networking Products	316-317
318	COMPUTER DISCOUNT WAREHOUSE	Networking Products	318
360	COMPUTER DISCOUNT WAREHOUSE	Networking Products	98-99
*	Novell, Inc	NDS	178-179
871	Seagate Software	Seagate Software-NSMG	NE7
909	Standard Microsystems Corp	TigerStack Hub, Ether Power II 10/100	NE10-NE11
MAIL ORDER			
*	CompUSA Direct	Mail Order	333-337
188	COMPUTER DISCOUNT WAREHOUSE	Reseller	100-101
147	COMPUTER DISCOUNT WAREHOUSE	Reseller	102-103
160	COMPUTER DISCOUNT WAREHOUSE	Reseller	104-105
121	COMPUTER DISCOUNT WAREHOUSE	Reseller	308-309
159	COMPUTER DISCOUNT WAREHOUSE	Reseller	310-311
109	COMPUTER DISCOUNT WAREHOUSE	Reseller	312-313
158	COMPUTER DISCOUNT WAREHOUSE	Reseller	314-315
129	COMPUTER DISCOUNT WAREHOUSE	Reseller	316-317
318	COMPUTER DISCOUNT WAREHOUSE	Reseller	318
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	98-99
283	Dirt Cheap Drives	Mass Storage	321
272	First Source International	Memory, Notebooks, Peripherals	348
*	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	48A-48P
278	Insight Direct	Insight Mail Order	322-323
295	J&R Music World	Systems, Hardware, Peripherals	394-397
003	Micro Warehouse	Notebooks, desktop and monitor	340-341
*	PCs Compleat	Mail Order	333-337
047	PC Connection	PCs, Peripherals, Software	342-343
330	PC Mall	Hardware, Software, Peripherals	324-325
068	PC Zone	Mail Order	328-329
074	Quantex	Quantex Systems	113-115
066	TigerDirect	Notebook, Desktop, Hard Drive, Reseller	407
055	Unicent	Systems, Mail Order	169-171
085	Winbook	XP5 Pro and FX Notebooks	77
MASS STORAGE			
283	Dirst Cheap Drives	Mass Storage	321
*	Imation	Travan DT	243
*	Iomega Corporation	Jaz	250-251
655	Micro Solutions Computer Products	Bantam CD ROM	346
309	S.A.G./Storage Solutions	Servers and Storage	22-23
MEMORY			
120	Crucial Technology	Micron Memory Upgrades	67
272	First Source International	Memory, Notebooks, Peripherals	348
106	Kingston Technology	Memory	228
019	L.A. Trade	Memory, Hard Drives, PCMCIA	330
880	Quarterdeck Office Systems	Procomm Plus 32	NE5
065	VisionTek	Extreme Drive	43
MISCELLANEOUS			
311	CIRQUE CORPORATION	Power Cat Touchpad	183
*	IBM Corporation	IBM Corporate Channel	213
012	Mindscape	Mavis Typing Tutor	388
193	Play Inc.	Snappy	53
352	Softbank Expos	Networld & Interop	349
*	ZD Net	ZD Net	97
MODEMS			
*	Diamond Multimedia Systems	56K Modem	399
*	US Robotics Inc	X2 Technology	149-152
*	US Robotics Inc	Big Picture	50-51
*	USR Mobile Communications Corp.	Modem Card	197
*	USR Mobile Communications Corp.	Accelerator Boards	199
MONITORS			
087	Acer America	Monitors	92
226	ADI Systems Inc	MicroScan 6P	80
*	EIZO NANAO Technologies, Inc.	Monitors	96
167	Hyundai Electronics	Monitors	393
170	KDS USA	Monitors	382
039	Mag InnoVision	MAG InnoVision Monitors	18-19

Reader Service No.	Company	Product	Page
117	Optiquest	Optiquest V95 19" Monitor	158
031	Princeton Graphic Systems	Princeton Graphic Systems Monitors	276-277
010	Midwest Computer Works	Monitors, Reseller	344
155	NEC Computer Systems	NEC LCD Monitor Display	236
157	NEC Computer Systems	A&E Monitors	125-128
021	Philips Business Electronics	Monitors	245
379	Toshiba Japan	Microfilter	120
118	ViewSonic	ViewSonic PT775/GT775 Monitors	64-65
MULTIMEDIA HARDWARE			
059	ATI Technologies	ATI Xpert	209
009	Cambridge Soundworks	Multimedia Speakers	94
*	CompUSA Direct	Mail Order	333-337
026	Creative Labs	PC-DVD	143
040	Creative Labs	Speakers	145
095	Creative Labs	AWE 64 Gold Card	181
248	Data Translation, Inc	Broadway	14
*	Intel Corporation	Team Station	117
855	Micro Solutions Computer Products	Bantam CD ROM	346
*	PCs Compleat	Mail Order	333-337
MULTIMEDIA SOFTWARE			
011	Corel Corporation	Wordperfect Suite 8 Pro/Netscape	132-133
041	Corel Corporation	Matrix	280
332	Corel Corporation	Draw 7	389
037	Corel Corporation	Galleria	392
*	Micrografx	Flowcharter 7	69
NETWORK INTERFACE CARDS			
093	AMBICOM, INC.	Network Interface Card	273
909	Standard Microsystems Corp	TigerStack Hub, Ether Power II 10/100	NE10-NE11
*	Xircom	Ethernet	25
NETWORKING SOFTWARE			
903	Computer Associates	ServerSuite	NE15
*	Dell Computer Corporation	Workstation	154-155
145	Microcom	Carbon Copy	164
*	Novell, Inc	NDS	178-179
*	Oracle Corp	Oracle InterOffice	11
880	Quarterdeck Office Systems	Procomm Plus 32	NE5
OCR SOFTWARE			
292	Caere Corporation	OmniForm	8
ORGANIZATIONAL SOFTWARE			
*	Microsoft	Microsoft Office	2-3
PC DIRECT			
*	CompUSA Direct	Mail Order	333-337
188	COMPUTER DISCOUNT WAREHOUSE	Reseller	100-101
147	COMPUTER DISCOUNT WAREHOUSE	Reseller	102-103
160	COMPUTER DISCOUNT WAREHOUSE	Reseller	104-105
121	COMPUTER DISCOUNT WAREHOUSE	Reseller	308-309
159	COMPUTER DISCOUNT WAREHOUSE	Reseller	310-311
109	COMPUTER DISCOUNT WAREHOUSE	Reseller	312-313
158	COMPUTER DISCOUNT WAREHOUSE	Reseller	314-315
129	COMPUTER DISCOUNT WAREHOUSE	Reseller	316-317
318	COMPUTER DISCOUNT WAREHOUSE	Reseller	318
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	98-99
*	Dell Computer Corporation	Latitude and Dimension	331
283	Dirt Cheap Drives	Mass Storage	321
272	First Source International	Memory, Notebooks, Peripherals	348
278	Insight Direct	Insight Mail Order	322-323
019	L.A. Trade	Memory, Hard Drives, PCMCIA	330
*	Leapfrog Lab Inc	Everex StepNote Series	338-339
855	Micro Solutions Computer Products	Bantam CD ROM	346
003	Micro Warehouse	Notebooks, desktop and monitor	340-341
010	Midwest Computer Works	Reseller, Mail Order, Hardware, PCs	344
047	PC Connection	PCs, Peripherals, Software	342-343
330	PC Mall	Hardware, Software, Peripherals	324-325
068	PC Zone	Mail Order	328-329
014	Paragon	Infinity	320
*	PCs Compleat	Mail Order	333-337
*	SPSS	SPSS 7.5 for Windows	345
051	USA Flex	Hardware, Software, Peripherals	347
PCMCIA			
019	L.A. Trade	Memory, Hard Drives, PCMCIA	330
*	US Robotics Inc	X2 Technology	149-152
*	US Robotics Inc	Big Picture	50-51
*	Xircom	Ethernet	25
PERIPHERALS			
*	3 Com Corporation	10/100 Ethernet Adapters	NE3
093	AMBICOM, INC.	Network Interface Card	273
186	BayNetworks Internet CPE Division	Instant Internet	264
311	CIRQUE CORPORATION	Power Cat Touchpad	183
*	Diamond Multimedia Systems	56K Modem	399
004	Epson America	Epson Printer	12-13
272	First Source International	Memory, Notebooks, Peripherals	348
*	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	48A-48P
*	Imation	Travan DT	243
295	J&R Music World	Systems, Hardware, Peripherals	394-397
117	Optiquest	Optiquest V95 19" Monitor	158
047	PC Connection	PCs, Peripherals, Software	342-343
330	PC Mall	Hardware, Software, Peripherals	324-325
220	Philips Electronics	Velo	218
*	Tektronix Inc.	Graphic Printing and Imaging	26-27
298	ViewSonic	ViewSonic PJ800 LCD Projector	230
118	ViewSonic	ViewSonic PT775/GT775 Monitors	64-65
*	Xircom	Ethernet	25
POWER PROTECTION			
342	American Power Conversion	Smart-UPS	201-203
341	American Power Conversion	Back-UPS Office	385-387
080	PC Power and Cooling	Power Protection/Cooling Devices	94
022	PK Electronics	Blackout Buster	223
PRESENTATION SOFTWARE			
005	Epson America	Epson Projectors	156-157
380	Matrox Graphics Inc	Rainbow Runner	162-163
PRINTERS			
004	Epson America	Epson Printer	12-13
*	Hewlett Packard	OfficeJet Pro 1150C	239
*	Hewlett Packard Peripherals	PhotoSmart	224-225
003	Micro Warehouse	Printers	340-341
*	Tektronix Inc.	Graphic Printing and Imaging	26-27
*	Visioneer	PaperPort Deluxe	186
PRINTER ACCESSORIES			
*	Ringdale	Fast Port	NE8

Advertisers' Index
PRODUCTS

Reader Service No.	Company	Product	Page
	PROGRAMMERS TOOLS UTILITIES		
903	Computer Associates	ServerSuite	NE15
176	PowerQuest Corp.	Drive Image	84
	REMOTE COMPUTING		
093	AMBICOM, INC	Network Interface Card	273
145	Microcom	Carbon Copy	164
088	Traveling Software	LapLink for Windows	305
*	US Robotics Inc.	X2 Technology	149-152
*	US Robotics Inc.	Big Picture	50-51
*	Xircom	Ethernet	25
	SCANNERS		
*	Hewlett Packard Peripherals	PhotoSmart	224-225
	SECURITY		
860	Trend Micro	NT Suite	NE16
	SERVERS		
092	Acer America	Mobile Client Server	138-139
*	Dell Computer Corporation	Dimension and Latitude	C5-C8
*	Dell Computer Corporation	Workstation	154-155
*	Dell Computer Corporation	Dimension	256-257
*	Dell Computer Corporation	Dimension	78-79
*	Hewlett Packard	NetServer	191
*	Oracle Corp	Oracle InterOffice	11
309	S.A.G./Storage Solutions	Servers and Storage	22-23
040	Unisys Corporation	Aquanta Servers	173-176
008	Unisys Corporation	Aquanta Servers	206-207
006	Unisys Corporation	Aquanta Servers	214
	SHAREWARE SOFTWARE		
192	White Pine Software Inc.	MeetingPoint Conference Server Software	272
	SOFTWARE		
134	01 Communique Laboratory	Communicate!	270
274	Adobe Systems Inc.	Adobe Illustrator 7.0	279
294	Cyber Media	First Aid '97	274
299	McAfee Associates, Inc	VirusScan	44
003	Micro Warehouse	Hardware, Software, Peripherals	340-341
*	Microsoft	Microsoft Office	2-3
*	Microsoft	Microsoft Money	56-57
012	Mindscape	Mavis Typing Tutor	388
149	NetObjects	Web Builder	267
047	PC Connection	PCs, Peripherals, Software	342-343
330	PC Mall	Hardware, Software, Peripherals	324-325
176	PowerQuest Corp	Drive Image	84
*	SPSS, Inc	SPSS 7.5 for Windows	345
088	Traveling Software	LapLink for Windows	305
860	Trend Micro	NT Suite	NE16
051	USA Flex	Hardware, Software, Peripherals	347
066	Newsoft	Presto Page Manager	287
	STATISTICAL SOFTWARE		
*	SPSS, Inc.	SPSS 7.5 for Windows	345
	TAX SOFTWARE		
*	Microsoft	Microsoft Money	56-57
	TRAINING SOFTWARE		
012	Mindscape	Mavis Typing Tutor	388
	UTILITIES		
294	Cyber Media	First Aid '97	274
299	McAfee Associates, Inc.	VirusScan	44
176	PowerQuest Corp	Drive Image	84
880	Quarterdeck Office Systems	Procomm Plus 32	NE5
	VIDEO CONFERENING		
306	ALARIS	QuickVideo	390
*	Intel Corporation	Team Station	117
380	Matrox Graphics Inc	Rainbow Runner	162-163
192	White Pine Software Inc	MeetingPoint Conference Server Software	272
	VIDEO GRAPHICS/BOARDS		
306	ALARIS	QuickVideo	390
*	Diamond Multimedia Systems	56K Modem	399
	WIN 95		
*	Pitney Bowes, Inc	Personal Post Office	302
064	Advanced Logic Research	Systems	298
*	Avery Dennison	Printers	300
177	Cardiff Software	Automated Data Entry	258
102	DataViz	MacOpener	306
211	Executive Software	Diskeeper 2.0	293
063	Helix Software Co	Nuts & Bolts	296-297
140	Hitachi	Monitors	290
390	In Focus Systems	Projector	292
130	MGI Software Corporation	PhotoSuite	301
144	Macromedia	Director	291
280	Mitsubishi Electronic America, Inc.	Monitors	295
086	NewSoft, Inc.	Presto! PhotoAlbum	287
125	PowerQuest	DriveCopy	299
146	Sceptre Technologies	Monitors	284
142	Sejin America	Freeboard	304
316	Sys Technology	Systems	303
060	TeleVideo	Monitors	252
243	Viagrafix	Design CAD97	288
	WINDOWS SOFTWARE		
903	Computer Associates	ServerSuite	NE15
207	Corel Corporation	CWPS8 Presentations	398
*	Micrografx	Flowcharter 7	69
*	Microsoft	Microsoft Office	2-3
176	PowerQuest Corp.	Drive Image	84
*	SPSS, Inc.	SPSS 7.5 for Windows	345
	WORK GROUP SOFTWARE		
*	Dell Computer Corporation	Workstation	154-155
*	Novell, Inc.	NDS	178-179
	WORKSTATION SOFTWARE		
*	Dell Computer Corporation	Workstation	154-155
	WORKSTATIONS		
*	Leapfrog Lab Inc.	PCs/Notebooks/Upgrades	338-339

For Additional Catagories see MARKETPLACE PRODUCT INDEX PAGE 350.

Coming Up

What's in the Next Issue of *PC Magazine*

Workgroup Servers

New lines of workgroup-class servers offer some of the same functions you find in high-end units: manageability, scalability, redundancy. We review systems from nine vendors.

56K Modems

Our first full-blown roundup of 56-Kbps modems turns up some results you need to see. We gather 19 modems from 12 vendors and put them through our torture tests.

Color Printers

Our annual review of the printer market kicks off in this issue. Color on every desktop? It's not as far-fetched as it sounds. Some of these color lasers have great price tags.

Total Cost of Ownership

As talk about the cost/benefits ratios of traditional PCs sweeps the industry, everyone is putting a spin on it—especially against the new NCs and Net PCs. We report on strategies that propose to drive your costs down and your productivity up.

ZD SOFTBANK ZIFF-DAVIS www.zdnet.com

ZIFF-DAVIS INC.

Chairman and CEO Eric Hippeau

Presidents Ronni Sonnenberg, Claude Sheer (U.S. Publications), Jeffrey Ballowe (Interactive Media and Development Group), Terri Holbrooke (ZD Brand and Market Group), William Rosenthal (Training and Support Publishing Group) **Vice-Presidents** Timothy O'Brien (Chief Financial Officer), J. Malcolm Morris (General Counsel and Secretary), Rayna Brown (Human Resources), Daryl R. Otte (Planning), Mark Moyer (Controller), Steve Gladyszewski (Information Systems) **Treasurer** Thomas L. Wright **Director, Public Relations** Gregory Jarboe

U.S. Publications Group
Presidents Claude Sheer (U.S. Publications), Lawrence C. Burstein (Consumer Media Group) **Senior Vice-President** Baird Davis (Circulation) **Executive Vice-Presidents, Business Media Group** Don Byrnes, Jack Dolce **Vice-Presidents** Tom McGrade (Business Manager), Jim Manning (Marketing Services), Bob Bader (Central Advertising Sales), Mark Van Name (Product Testing), James F. Ramaley (Circulation Services), Al DiGuido (Group Publisher), Roger Herrmann (Production), Chris Dobbrow, Jim Louderback, Michael J. Miller, Nancy Newman, Paul Somerson, Sam Whitmore **Executive Director, Licensing** Gertrud Borchardt **Director, ZD Labs** Mark Hall **Director, Benchmark Operation** Bill Catchings

Interactive Media and Development Group
President Jeffrey Ballowe **Executive Vice-President** David Shnaider **Executive Vice-President** Daniel Rosensweig (President, ZDNet) **Vice-Presidents** Daniel Farber (Editor-in-Chief, ZDNet), James Savage (General Manager, ZDNet), Richard Fisher (ZDTV) **Editorial Director, New Products** Bill Machrone **Group Business Manager** Jocelyn Grayson

ZD Brand and Market Group
Presidents Terri Holbrooke, Bob Brown (Computer Intelligence) **Executive Vice President** Joe Gillespie (Corporate Sales) **Vice Presidents** Herb Stern (ZD Brand), Elda Vale (ZD Research) **Executive Director, Sales Marketing** Mike Perkowski **Director, Corporate Relations** Gregory Jarboe **Ziff-Davis Media Network: Executive Director** Jeff Bruce **Managing Director** Rita Burke **Directors** Ken Beach, Michael Bird, Dan Daly, Melinda Maginn, Scott Murphy **Associate Network Directors** Robin Kofsky, Debbie Moss, Julie Tuttle

PC Magazine, ISSN 0888-8507, is published twice a month except in July and August, at $48.97 for one year. Ziff-Davis Inc., One Park Ave., New York, NY 10016-5802. Periodicals postage paid at New York, NY 10016-5802 and at additional mailing offices. POSTMASTER: Address changes to *PC Magazine*, P.O. Box 54093, Boulder, CO 80328-4093. The Canadian GST registration number is 14049 6720 RT. Printed in the U.S.A.

TigerDirect® Software, Hardware Systems, Accessories YOUR SOURCE FOR PCs

VISIT OUR WEB SITE: WWW.TIGERDIRECT.COM

800-782-1431

For Windows 95 & NT! AMD K6 MMX PROCESSOR

200MHz And 233MHz Speeds With MMX Technology!

1 YEAR ON-SITE WARRANTY

"The Tiger K6 233 was this roundup's leading performer..."
"...its Business Winstone score led the pack."
"...its MMX numbers were unmatched."
—PC Magazine

We've Mounted The K6 Chip On One Of The Industry's Most Feature-Packed Motherboards!

While the AMD K6 MMX processor is pulsating with ready-to-run power, the motherboard that we've selected for these systems adds its own dimension of advanced technology. All these systems include this ATX-size motherboard, which features new DIMM memory slots—one of the most asked-for features in the business. The twin 168-pin slots transfer data at 64 bits (twice the rate of SIMMs). And they support both EDO and new SDRAM memory. The new optimized VIA VP2 chipset is the fastest yet—bursting hard disk transfers up to 33MB/sec! This new Ultra DMA/33 mode is easily 50% faster than the previous best. The VIA VP2 chipset also supports Microsoft's PC97 specifications for advanced power management, USB connections and more. There's even error-free ECC memory support that's the favorite of network servers (while power-users usually opt for the super-fast SDRAM support).

You simply can't find a better, more advanced motherboard. Here's a rundown of some of the other great features... You get a whopping 512K of Pipelined Burst cache. This motherboard runs the bus at up to 75MHz—that's 14 percent faster than the old 66MHz barrier of other motherboards. And you'll love the PCI bus speed of the VIA VP2 with its Concurrent PCI; it's faster than the old technology in Intel's Triton. Includes a printer port that's 10 times faster than earlier ports, 2 USB (Universal Serial Bus) ports, an IrDA connector to add infrared options, 2 serial ports (with lightning-fast 16550 UART chips), four 32-bit Master PCI slots, four 16-bit industry-standard ISA slots and more. The Close-Up below shows you all the details. The most advanced motherboard for the world's fastest Windows 95/NT processor!

NEW!

CUSTOM CONFIGURATIONS AVAILABLE!

Now we will custom-build these systems to your exact specifications! Please call us for a complete list of options and prices! Design the perfect system!

All AMD-K6™ MMX™ Systems Include:

- Premium Windows 95 Keyboard
- PS/2 Two-Button Mouse
- Boom Microphone
- Windows 95 Release 2 Pre-loaded
- 3.5" 1.44MB Diskette Drive
- ATX 64-Bit Motherboard
- Dual Channel I/O Controller
- Two 16550 Serial Ports
- 9-Bay Mid-Tower ATX Case
- One ECP/EPP Parallel Port
- Infrared IrDA Connector
- Two Universal Serial Bus Ports
- 512KB Pipeline Burst Cache
- Triple-Fan Cooling System (Extra Fan in front of case)
- 200-Watt Power Supply

AMD-K6 200 MMX System

- AMD-K6 200MHz MMX Processor
- 32MB High-speed EDO RAM
- 3.0 GB EIDE Hard Disk
- 20X CD-ROM Drive
- S3 ViRGE 64-Bit 3D Video
- 4MB Video Memory
- 33.6K Faxmodem with Voice
- 16-Bit Multimedia 3D Sound
- Amplified Stereo Speakers
- 1 Year On-Site Warranty

A113-1320 **$1,099.99**

AMD-K6 233 MMX System

- AMD-K6 233MHz MMX Processor
- 32MB High-speed EDO RAM
- 3.0 GB EIDE Hard Disk
- 20X CD-ROM Drive
- Matrox Mystique 220 3D Video
- 4MB Video Memory
- 33.6K Faxmodem with Voice
- 16-Bit Multimedia 3D Sound
- Yamaha Amplified Stereo Speakers
- 1 Year On-Site Warranty

A113-1330 **$1,349.99**

Sorry, but as prices are always changing on CPUs, we do not offer price protection in the event prices rise or fall. See page 77 for details and warranty information. Case design may vary due to updates.

The World's Most Advanced Notebook; 233MMX or 6x86!

AMAZING! $1699.99

6x86L PR166+, 16MB EDO RAM, 1.3GB Hard Drive, 10X CD-ROM

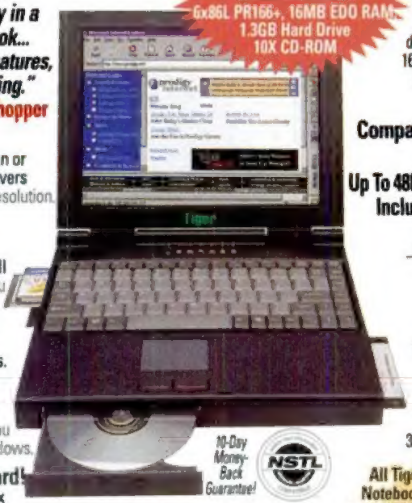
"The Tiger GT offers high-end components and a brilliant display in a value-priced notebook... for pure price and features, the Tiger GT is the king."
–Sept 97, Computer Shopper

Hot Color!
The 12.1" SGVA Dual Scan or Active Matrix display delivers crisp, brilliant 800 x 600 resolution.

Easily Connect With The World...
Two Type II or one Type III PCMCIA slots provide you with a world of communications options including faxmodem and Ethernet connections.

Ergo Functionality.
The integrated GlidePad with 2 buttons enables you to navigate easily in Windows.

Work Hard, Play Hard!
Includes lightning-fast 10x CD-ROM for multimedia, reference—or play your favorite audio CDs; even while you're working!



10-Day Money-Back Guarantee! NSTL

Pure Digital Sound
Built-in digital stereo speakers deliver exceptional 16-bit SoundBlaster compatible audio.

Duracell-Compatible Battery.
Replace Easily!

Up To 48MB EDO RAM! Includes SO-DIMM RAM Socket
...For Easy Upgrades Up To 80MB!

Gigabytes Of Capacity.
Store multimedia, sound, video, and graphics on massive 1.3, 1.6, 2.0 and 3.0 GB hard drives.

All Tiger Notebooks Include Corel's Acclaimed WordPerfect Suite 8

Available In New Power-Saving 6x86L-PR166+ And Pentium 166MMX, 200MMX And 233MMX Versions! All Include Standard Processor Socket For Easy Future Upgrades!

The days of overpriced notebook PCs are over! Tiger presents a new lineup of ultra-powerful notebooks that deliver the absolute latest technology at direct-from-the-manufacturer prices. We have four advanced stock systems, including a low-voltage IBM/Cyrix 6x86L PR166+ model, a Pentium 166MMX, Pentium 200MMX, and the world's fastest notebook—a speed-burning Pentium 233MMX! Plus we can custom-configure any system to your specifications. The chart below contains all the specs on these individual configurations, so take a look—compare and you'll love our new Tiger notebooks—and they're covered by a rock-solid guarantee!

Packed With The Latest Technology!
...Including your choice of huge 12.1" Active Matrix or high-contrast Dual Scan displays! Although we offer Tiger models with Active Matrix display, you won't be disappointed with the 12.1" Dual Scan—and the price is unbelievably low!

Affordable And Advanced...
With a full range of I/O ports tucked neatly away in the back, this advanced notebook lets you connect to a host of peripheral options.

Easy Upgradability—Memory *And* Processor!
Hidden by a removable cover, the standard SO-DIMM memory socket and Pentium or Cyrix processor (in a standard 321-pin socket) are easily accessible for future upgrading.

All Tiger Notebooks include an AC Adapter.

NEW! **CONFIGURATIONS AVAILABLE!**
We will custom-build these notebooks to your exact specifications! Call for a complete list of options! Design the perfect notebook!

HOT TIGER NOTEBOOK ACCESSORIES

A113-5910	8MB SO-DIMM	$79.99
A113-5912	16MB SO-DIMM	$149.99
A113-5914	32MB SO-DIMM	$279.99
A113-5915	64MB SO-DIMM	$599.99
A113-5960	Extra AC Adapter	$89.99
A113-5940	Port Replicator	$149.95
A113-5950	Extra Battery	$99.99
T22-1001	Targus Case	$39.99
D115-9000	56K Modem	$129.99*

* With Purchase Of Notebook.

Port Replicator Available...
Just connect your external keyboard, printer, mouse and monitor! A compact docking station! *(Requires AC Adapter)*

All Tiger Notebooks Include...

- 12.1" Active Matrix or High-Contrast Dual Scan Display • Windows 95 Pre-Installed
- Corel WordPerfect Suite 8 Pre-Installed • TV-out Port for big-screen presentations
- 16-Bit SoundBlaster compatible audio • PCMCIA slot—Type II or Type III
- 128-bit PCI graphics With 1.2MB RamBUS RAM
- ZV card support for full-screen MPEG
- Built-in digital stereo speakers • GlidePad pointing device
- 3.5" 1.44MB Floppy drive • Duracell-compatible NiMH battery

1 YEAR WARRANTY

Item#	Processor	RAM/Exp. To	HD	CD-ROM	System	Screen	Price
A113-5010	**Cyrix 6x86L PR166+**	16MB EDO/80MB	1.3 GB	10X	Windows 95	12.1" Dual Scan	$1,699.99
A113-5030	**Intel Pentium 166MMX**	16MB EDO/80MB	1.6 GB	10X	Windows 95	12.1" Active Matrix	$2,299.99
A113-5040	**Intel Pentium 200MMX**	32MB EDO/80MB	2.0 GB	10X	Windows 95	12.1" Active Matrix	$2,729.99
A113-5050	**Intel Pentium 233MMX**	48MB EDO/80MB	3.0 GB	10X	Windows 95	12.1" Active Matrix	$3,499.99

VISIT US ON THE WEB AT WWW.TIGERDIRECT.COM FOR LOW PRICES ON THOUSANDS OF PRODUCTS, LIVE AUCTIONS, AND COMPLETE PRODUCT INFORMATION!

3GB HARD DRIVE

CAPACITY	3.0 GB
INTERFACE	EIDE Mode 4
SEEK TIME	14 msec
TRANSFER RATE	16.6 MB/S
SPINDLE SPEED	4500 RPM
BUFFER	128KB
BAY SIZE	3.5"
WARRANTY	3 years

JTS CHAMPION INCREDIBLY PRICED! JUST... $199.99

MEMORY PNY SALE!

LOWER PRICES ON ALL MEMORY

8MB $39.99 # P56-1022
16MB $79.99 # P56-1024
32MB $159.99 # P56-1026

Adobe Illustrator

Vector Drawing & Illustration

FROM $114.99*

Adobe Illustrator 7.0

TO ORDER...ANYTIME 800-782-1431

...Or visit our web site at WWW.TIGERDIRECT.COM. We accept VISA, MasterCard, American Express, Discover and Diners Club. All products carry Tiger's 30-Day GUARANTEE against defects. Returns for defective exchange only. Call for more information and details on exact shipping charges. *All prices subject to change*

FREE Tiger Catalog

Get a FREE subscription of the TigerDirect catalog—each issue features over 100 pages packed with new hardware, software, systems and accessories! You'll get the latest on the best that the computer industry has to offer, at the lowest prices!

800-782-1431

CLK

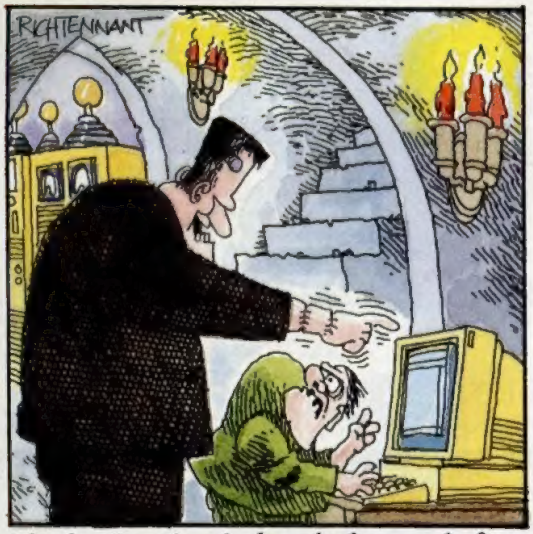
CIRCLE 066 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Abort, Retry, Fail?

Either ☞ Reggie Jackson is very very big, or that notebook is very very small. (Viking Components ad.)

Our Deepest Sympathies...and 20 Percent Off on Bonbons

Faithful reader Joan Spector used America Online's gift reminder program to make a note of the anniversary of her brother-in-law Harold's death. Two weeks before the anniversary, she got this message from AOL: "Harold will be celebrating a date of death on May 11. Now's your time to start looking for that special gift. Recommended shopping sites: Cheeky Weasel, Godiva Chocolatier, Marketplace, The Shopoloigist. Best regards!"

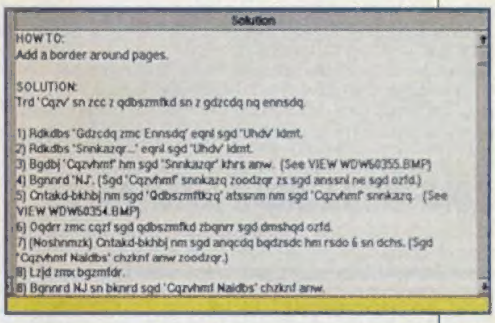


"Look, I've already launched a search for 'reanimated babe cadavers' three times and nothing came up!"

Unsolved Mysteries from The Police Log

"Computer equipment worth $3,674 was reported stolen from ADT Security Systems. There was no sign of a forced entry."—Greenburgh, New York

"An Oaklawn Avenue resident reported finding an Atari computer in the river while fishing."—Orange, Massachusetts



All That Annoying Jargon

"Cybernauts may have noticed that the 'Watch This Space' button on the Web site of the National Weekly Edition links them to gobbledy gook. There is a reason for this, but we don't know what it is. But we are bringing in some tech support types who do. Please bear with us."—*The Washington Times*

Hey, is that solution written in Albanian? (*Network Computing* magazine.)

Looks like we've misunderstood Lotus 1-2-3 for all these years. (J&R Music World ad.)

If your entry is used, we'll send you $50 and a PC Magazine T-shirt. Send your entries to Abort, Retry, Fail?, PC Magazine, One Park Ave., New York, NY 10016-5802. Winners this issue: Bruce Atlas, Cemil Betanov, Lee Girer, Chuck Julian, Marlene Maloney, Dan Sachs, and Joan Spector.

ILLUSTRATION BY DAVID BRION

Service
ce, add $99.

DELL DIMENSION M200a
200MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:
- 16MB SDRAM Memory
- 3.2GB Hard Drive (12ms)
- 800HS Trinitron Monitor (13.7" v.i.s., .26dp)
- 2MB EDO ViRGE 3D Video
- 3Com 3C509B EtherLink III 10Mbit ISA Combo Card
- Iomega Zip 100MB Internal Drive with One Cartridge
- ★ *Upgrade to 32MB SDRAM, add $99.*
- ★ *Sound Blaster 16 PnP and Altec Lansing ACS-90 Speakers, add $89.*

$1799

Business Lease: $65/Mo.
Order Code #500905

SOFTWARE DESCRIPTIONS

MS Office 97 Small Business Edition (SBE) includes:
- Word 97
- Excel 97
- Publisher 97
- Outlook 97
- Automap Streets Plus
- Small Business Financial Mgr 97
- Internet Explorer 3.0

MS Home Essentials plus Best of Entertainment Pack (available on desktops only) includes:
- Word 97
- Works 4.0
- Encarta 97
- Greetings Workshop
- Arcade
- Internet Explorer 3.0
- TETRIS, Taipei, SkiFree, Dr. BlackJack and more.

DELL POWEREDGE SERVERS

Common features: ◆ 512KB Integrated L2 ECC Cache ◆ Integrated PCI Ultra-Wide SCSI-3 Controller ◆ Intel® Pro/100B PCI Ethernet Adapter ◆ Intel LANDesk® Server Manager v2.5x ◆ **3 Years Next Business Day On-site Service**

DELL® POWEREDGE™ 2200 SERVER
266MHz PENTIUM II PROCESSOR
Dual Processor Capable, RAID Capable

Common features listed above plus:
- 64MB ECC EDO Memory (512MB Max)
- 4GB Ultra-Wide SCSI-3 Hard Drive (27GB Max)
- 8X SCSI CD-ROM Drive
- 3Com Office Connect Hub 8-Port/TPC
- MS Windows NT® Server 4.0 (10 Client Access Licenses)
- 6 Drive Bays: 3 Hard Drive, 3 Removable Media
- 6 Expansion Slots: 3 PCI, 3 EISA

$4749

Business Lease: $166/Mo.
Order Code #250081

DELL POWEREDGE 2200 SERVER
233MHz PENTIUM II PROCESSOR
Dual Processor Capable, RAID Capable

Common features listed above plus:
- 32MB ECC EDO Memory (512MB Max)
- 2GB Ultra-Wide SCSI-3 Hard Drive (27GB Max)
- 8X SCSI CD-ROM Drive
- MS Windows NT Server 4.0 (10 Client Access Licenses)
- 6 Drive Bays: 3 Hard Drive, 3 Removable Media
- 6 Expansion Slots: 3 PCI, 3 EISA
- ★ *APC Smart-UPS 700w Power Supply, add $399.*

$3749

Business Lease: $134/Mo.
Order Code #250085

MS ARE BUILT FOR SPEED. ED TO FLY.

DELL LATITUDE NOTEBOOKS

Common features: ◆ 256KB L2 Pipeline Burst Cache ◆ Options Bay accepts CD-ROM (20X Max[m] Variable on LM M166ST or 12X Max[m] Variable on LM M133ST), 3.5" Floppy Drive (both included), or Optional 2nd Li-Ion Battery ◆ PCI Bus with 128-bit Graphics Accelerator with 64K Colors ◆ Integrated 16-bit Stereo Sound ◆ Smart Lithium Ion Battery ◆ Microsoft Windows 95 ◆ IrDA 1.0 Standard Compliant ◆ Touchpad ◆ Under 7 Pounds* ◆ Extendable 1 Year Warranty†

DELL LATITUDE™ LM M166ST
166MHz PENTIUM PROCESSOR W/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix Display
- 72MB EDO RAM
- *NEW* 4GB Hard Drive
- MS Office 97 Small Business Edition
- ★ *2nd Lithium Ion Battery, add $199.*
- ★ *Leather Carrying Case, add $99.*
- ★ *3Com Lan+ 33.6 Modem PC Card, add $299.*
- ★ *Dell Latitude LM Port Replicator, add $159.*

$3999

Business Lease: $141/Mo.
Order Code #600168

DELL LATITUDE LM M166ST
166MHz PENTIUM PROCESSOR W/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix Display
- 40MB EDO RAM (72MB Max)
- 2.1GB Hard Drive
- Motorola 33.6 Fax Modem
- MS Office 97 Small Business Edition
- ★ *Upgrade to 72MB EDO RAM, add $299.*
- ★ *Upgrade to a NEW 4GB Hard Drive, add $349.*
- ★ *2nd Lithium Ion Battery, add $199.*
- ★ *Leather Carrying Case, add $99.*

$3499

Business Lease: $123/Mo.
Order Code #600169

DELL LATITUDE LM M166ST
166MHz PENTIUM PROCESSOR W/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix Display
- 16MB EDO RAM (72MB Max)
- 1.6GB Hard Drive
- MS Office 97 Small Business Edition
- ★ *Upgrade to 40MB EDO RAM, add $299.*
- ★ *Upgrade to a 2.1GB Hard Drive, add $149.*
- ★ *2nd Lithium Ion Battery, add $199.*
- ★ *NEW 56K Capable** x2 Modem, add $149.*
- ★ *Dell Latitude LM Port Replicator, add $159.*

$2899

Business Lease: $105/Mo.
Order Code #600140

***NEW* DELL LATITUDE LM M133ST**
133MHz PENTIUM PROCESSOR W/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix Display
- 16MB EDO RAM (72MB Max)
- 1.6GB Hard Drive
- MS Office 97 Small Business Edition
- ★ *Upgrade to 24MB EDO RAM, add $99.*
- ★ *Upgrade to a 2.1GB Hard Drive, add $149.*
- ★ *2nd Lithium Ion Battery, add $199.*
- ★ *Nylon Carrying Case, add $69.*
- ★ *Dell Latitude LM Port Replicator, add $159.*
- ★ *3Com 10Base-T Network Card, add $129.*

$2599

Business Lease: $94/Mo.
Order Code #600154

Call for details on Dell's Business Leasing and new Personal Leasing programs.

TO ORDER TOLL-FREE

800-932-4357

TO ORDER ONLINE

www.dell.com/buydell

Mon-Fri 7am-9pm CT
Sat 10am-6pm CT
Sun 12pm-5pm CT
In Canada,* call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04539

DELL®

NEC Direction PCs *A new direction in cutting edge technology.*

Common Features: Mini-Tower or Desktop Tool-Less Chassis • 24X max CD-ROM • 3.5" Floppy Drive • Microsoft® Windows® 95 • MS® Office 97 SBE • 2 USB Ports • Microphone • Palmrest Keyboard and MS IntelliMouse® • 3-Year Limited Warranty with 1-Year On-Site Service • *DirecPC Satellite Dishes are Now Available as Upgrades on all Direction Systems*

Direction SPL300

- 300MHz Pentium® II processor with MMX™ technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 9.0GB SCSI Hard Drive/64MB SDRAM
- Adaptec 2940UW SCSI Controller
- Number Nine AGP Revolution 3D, 4MB WRAM
- Altec® ACS-90 Speakers/Integrated Yamaha Sound
- Iomega® Zip Drive
- NEC C700™ 17" Monitor (16" v.i.s.)
- MS Windows NT® 4.0
- * Upgrade to 128MB SDRAM, add $379
- * Upgrade Video Memory to 8MB WRAM, add $119

$4229
Business Lease: $148/mo.

Direction SPL266

- 266MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- NEC C550 15" Monitor (14" v.i.s.)
- * Upgrade to Wavetable Audio, add $49
- * Upgrade to U.S. Robotics® 56Kbps* Data/Fax/Voice Modem, add $119
- * Upgrade to NEC C700 17" Monitor (16" v.i.s.), add $199

$2329
Business Lease: $84/mo.

Direction SPL233

- 233MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C550 15" Monitor (14" v.i.s.)
- * Upgrade to 7.0GB Hard Drive, add $109
- * Upgrade to Number Nine AGP Revolution 3D, 4MB WRAM, add $219

$2199
Business Lease: $79/mo.

Direction SPL300

- 300MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 6.4GB Ultra DMA Hard Drive, 9.5ms/64MB SDRAM
- Number Nine AGP Revolution 3D, 8MB WRAM
- Altec ACS-45 Speakers/Wavetable Audio
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to Altec ACS-410 Speakers with ACS-251 Subwoofer, add $69

$3499
Business Lease: $126/mo.

Direction SPL300

- 300MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 7.0GB Ultra DMAHard Drive/64MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Wavetable Audio
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to Number Nine AGP Revolution 3D, 4MB WRAM, add $219
- * Upgrade to Iomega Zip Drive, add $99

$2949
Business Lease: $106/mo.

Direction SPT233

- 233MHz Pentium processor with MMX technology/512KB L2 Pipeline Burst Cache
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-45 Speakers/AWE32 Wavetable Audio
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to Altec ACS-410 Speakers with ACS-251 Subwoofer, add $69
- * Upgrade to U.S. Robotics 56Kbps* Data/Fax/Voice Modem, add $119

$2379
Business Lease: $86/mo.

Direction SPT233

- 233MHz Pentium processor with MMX technology/512KB L2 Pipeline Burst Cache
- 6.4GB Ultra DMA Hard Drive, 9.5ms/64MB SDRAM
- Number Nine PCI Revolution 3D, 8MB WRAM
- Altec ACS-45 Speakers/Wavetable Audio
- Iomega Zip Drive
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to 128MB SDRAM, add $379
- * Upgrade to Altec ACS-410 Speakers with ACS-251 Subwoofer, add $69

$2889
Business Lease: $104/mo.

Direction SPT233

- 233MHz Pentium processor with MMX technology/512KB L2 Pipeline Burst Cache
- 7.0GB Ultra DMA Hard Drive/32MB SDRAM
- Number Nine PCI Revolution 3D, 4MB WRAM
- Altec ACS-45 Speakers/AWE32 Wavetable Audio
- Iomega Zip Drive
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to NEC MultiSync® A700™ 17" Monitor (15.6" v.i.s.), add $229
- * Upgrade to 64MB SDRAM, add $199

$2649
Business Lease: $95/mo.

Direction SPT200

- 200MHz Pentium processor with MMX technology/512KB L2 Pipeline Burst Cache
- 3.2GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM PCI Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C550 15" Monitor (14" v.i.s.)
- * Upgrade to NEC C700 17" Monitor (16" v.i.s.), add $199
- * Upgrade to Iomega Zip Drive, add $99

$1789
Business Lease: $64/mo.

NEC Versa® 2700 Series Notebooks *All-in-one convenience at a sensible price.*

Common Features: PCI Bus with 128-bit Graphics Accelerator • 256KB L2 Pipeline Burst Cache • 32-bit CardBus Support • 2MB VRAM • USB Port • 56Kbps* Integrated Modem • Stereo Speakers and Subwoofer with 3D Stereo Sound • DMI 2.0 Compliant • Intel LANDesk® Manager 3.0 • MS Windows 95 • Bundled MS Software Including MS Word 97 • Upgradeable 1-Year Limited Warranty

Versa 2760MT

- 166MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB EDO DRAM (96MB max)
- Built-in 2.1GB Hard Drive, 16X max CD-ROM, 1.44MB Floppy Drive, and Lithium Ion Battery
- * Upgrade to 80MB RAM, add $699
- * Optional 2nd Lithium Ion Battery, add $199
- * Optional Versa PortBar™ 2700 Port Replicator, add $159
- * Optional NEC Xircom 10Base-T Network Card, add $139

$3199
Business Lease: $115/mo.

Versa 2730MT

- 133MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB EDO DRAM (96MB max)
- Built-in 1.44GB Hard Drive, 16X max CD-ROM, 1.44MB Floppy Drive, and NiMH Battery
- * Upgrade to 48MB RAM, add $299
- * Optional Lithium Ion Battery, add $199
- * Optional VersaPro™ Ballistic Nylon Carrying Case, add $99
- * Upgrade to a 2.1GB Hard Drive, add $149

$2799
Business Lease: $101/mo.

Versa 2730M

- 133MHz Pentium processor with MMX technology
- 12.1" SVGA DSTN Color Display
- 16MB EDO DRAM (96MB max)
- Built-in 1.44GB Hard Drive, 16X max CD-ROM, 1.44MB Floppy Drive, and NiMH Battery
- * Upgrade to 32MB RAM, add $159
- * Optional Lithium Ion Battery, add $199
- * Optional VersaNote™ Ballistic Nylon Carrying Case, add $69
- * Upgrade to a 2.1GB Hard Drive, add $149

$2349
Business Lease: $85/mo.

To order, get a free catalog or find your nearest reseller call:
Mon-Fri 8am-8pm EST

1-888-8-NEC-NOW
Dept. No. PM576A www.necnow.com

NEC